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CONTENTS

EDITORIAL:
Editorial Notes 441
The North Haven Collision..... 442
Banking Influence on Railroad Management..... 443
Fundamentals of Valuation of Public Utilities..... 444

LETTERS TO THE EDITOR:
Engine House Pay 446

MISCELLANEOUS:
*Mountain Railway Electrification; by Allen H. Babcock..... 447
A Plea Against Hasty Legislation..... 449
Original Cost Versus Replacement Cost as a Basis for Rate Regulation; by Raymond V. Hayes..... 450
*Construction of the Portland, Eugene & Eastern..... 453
*Locomotive Tractive Effort; by H. A. Houston..... 455
Interpretation of the Rules of Interchange..... 457
Comparative Summary of Freight Cars in Service..... 458
The North Haven Collision..... 461
*Combination Brass, Iron and Steel Foundry..... 467
Foreign Railway Notes 446, 454, 458

GENERAL NEWS SECTION..... 469

*Illustrated.

THE government-owned Intercolonial Railway of Canada is hardly a model either in economies of operation, earning power or standards of upkeep for American railroads more favorably situated; but there is one lesson which American railroad officers having to do with the training of employees might well take from the Intercolonial. No matter how infrequent the service, how slow the trains, what the delay, one experiences generally, when traveling on the Intercolonial, numerous instances of little courtesies by employees which take the edge off of annoyance and, one sometimes suspects, actually go further toward making a satisfied patron than would the expenditure of many hundreds of thousands of dollars for better roadbed and equipment. The Intercolonial has succeeded in creating a public opinion among its own employees which is distinctly adverse to the smart or surly rejoinder of a trainman to even a silly question by a passenger. The question of whether or not the train will be on time is as important a subject of speculation when traveling as the weather is in daily life. Why should not trainmen be taught to give a courteous answer to this continually recurring question from passengers, and yet this is the one question which almost never receives a courteous, intelligent answer. It may be that the Canadians are naturally more polite than the same classes in the United States. If so, there is all the more reason why pains should be taken by American railroad officers to cultivate a spirit of politeness in those of their forces who come in contact with railroad patrons.

MR. BABCOCK'S discussion of the advantages of the electrification of steam railroads having heavy grades, with special reference to Tehachapi Pass on the Southern Pacific, which is abstracted on another page in this issue, is radically different in tone from many of the previous papers on electrification. Most of these have advocated the adoption of electric power on roads now operated by steam. Mr. Babcock is a practical steam railroad man who has been forced to go into the problems of electrification very thoroughly within recent years. The electrification of the mountain districts of the Southern Pacific must be justified, if at all, by increased economy in operation rather than by results such as increased safety, the elimination of smoke, the development of passenger traffic, etc., which have been the ends sought in practically all the electrification of steam roads, which has been done up to date. The problem on the Southern Pacific has been the subject of very animated discussions for several years. The contrast between this and previous papers brings out sharply the failure of many electrical engineers to understand steam road problems and to adjust their dissensions and plans to these conditions. The papers read before the American Institute of Electrical Engineers and other associations have been devoted more to technical details than to the larger problems of the practical application of electricity to steam road operation. Electrical engineers have complained that steam railway men refuse to adjust their methods of operation to secure the best results from electrification. Many of them have failed to realize that it will be necessary, at first at least, for them to adapt electrification to existing steam road practice. If the results then gained are measurably satisfactory, steam railroad men may become willing to revise their methods to secure yet greater advantages from electrification. Likewise, comparisons between steam and electric operation should be based upon the best types of steam locomotives, in which connection James J. Hill has said that the development of the Mallet locomotive has set back electrification at least 10 years. The paper by Mr. Babcock is timely in view of the widespread interest in the subject of electrification of trunk line railroads, and should stimulate the collection of data regarding the economies actually attained under such operation. Such material has not been available to any considerable extent up to the present time.

THE case of Engineman Miller, responsible for the wreck at signal No. 23 at North Haven, Conn., ought to be highly instructive to those editors who theorize so confidently that financial mismanagement has been the cause of the train accidents on the New Haven road, as well as to railroad officers who are content to let their own reputation as disciplinarians rest on the slender support of the doctrine that when a man's own life is at stake he will surely be on his guard. Miller is in the prime of life, and of good habits; has had years of experience and was on his regular run. He had 12 hours off duty the day before he began this night run. He seems to have a rather nervous temperament, but the general manager is quoted as saying that, in spite of the mistake in this case, he would like more such runners. Miller had a clear record of two years six months, but had one or two demerits in his years as

runner before that. He had had to be vigilant for 50 miles on this trip on account of the fog, and there is no suspicion that he was asleep. He was perfectly acquainted with the road and knew that he was approaching a stop signal, and it seems to be quite certain that he simply "lost his bearings" in the fog, which means, in other words, miscalculating distance, or allowing the mind to wander for a few seconds, sufficiently to forget all about distance. The line is straight; he had gone less than a mile and a half from the last preceding signal (No. 25) which both he and his fireman say they saw (and called). Ordinary fields lie on both sides of the line with no cuts, fills, trees, buildings or other landmarks, except a gravel pit, not far from signal No. 25. The gravel pit seems to have been the runner's one landmark, and, for some unexplained reason, he did not take advantage of it. No one who was present at the hearings treats his story as other than honest. It is possible that having only 85.7 per cent. of the cars braked was an element in his miscalculation; or that with the 125-ton engine he was not so fully the master of the situation as he would have been on an engine with which he had had longer experience; but he offered nothing of this kind as an excuse or defence. He had run this engine on this train two months. It may be that he was in the habit of thinking that to stop 100 ft. beyond a block signal was safe enough—other witnesses testified that such over running happened rather frequently—but against this supposition we have the fact of his good record and his apparently consistent purpose to maintain it. Errors exactly like Miller's occur, probably, every month, perhaps oftener, on roads of which the financial management is not only not blamed, but is praised. No one has accused even Mr. Mellen of denying his superintendents any facilities or any money that they needed or wanted for educating their enginemen. Clearly the remedy for this kind of error must be looked for somewhere else than in an investigation of "Wall Street."

ENGINEMAN MILLER had been doing two men's work for a week prior to the wreck, and this fact is the subject of innumerable "scare-heads" in the daily papers, both yellow and white. But the fact is that he did this while still being on duty only 10 hours a day; five hours 17 minutes, plus delays, on the road, and four hours 43 minutes at terminals, including a rest of three hours 35 minutes, at Springfield. If he had been doing only his own work he would have been on duty about 10 hours *every other day*. The news editors who shout "overwork" ought to say specifically whether they consider these hours excessive; and then they will do well to ask a few representative enginemen how strongly they object, when well paid, to working regularly nine hours out of every 24. There is no claim that Miller was either tired or sleepy, and this question of hours has to do with the general practice rather than with the cause of this particular collision; but it is to be noted that if there was any trouble anywhere it was in the way that Miller spent his time off duty. His day was spent as follows, the two central columns representing the run of his engine and the two shorter columns his dead-head trips from and to his home.*

	Miles.	Read down.	Read up.	Read down.	Read up.
Springfield	0	.....	Ar. 12:35 a.m.	Lv. 4:20 a.m.	.....
Home.....	..	Lv. 4:30 p.m.	.....	.....	Ar. 11:00 a.m.
New Haven	62	6:14 p.m.	10:52 p.m.	5:45 a.m.	10:08 a.m.
Stamford.	102	Ar. 7:12 p.m.	Lv. 9:56 p.m.	Ar. 6:56 a.m.	Lv. 9:09 a.m.

He lived at Montowese, on the Air Line division, four miles from New Haven. How he got from there to New Haven, whether by freight train or street car, does not appear (the time table shows no passenger trains at the hours named). Being off duty over 14 hours each day, even when doing two men's work, he yet had only 5 hours 30 minutes for uninterrupted rest, on a bed. He could sleep 8 or 9 hours—provided his nerves were calm enough—but he had to do it in three places. No one can say that this work-day schedule actually had the effect of making Miller unfit to run; but we lay it before the reader because it affords a striking illustration of an objectionable practice which prevails on railways generally. From any high standpoint, either business or hygienic, it should be held to be not only objectionable but absolutely bad. To apportion the blame for this would not be easy. Both the railroads and the brotherhoods have a responsibility in the premises. It is a grave responsibility. The blame for a wreck may not for years be found definitely chargeable to this bad practice, but everybody can see its badness, nevertheless. In academic discussions we all recognize the value of regular rest; why should we not act as we talk? And Miller's testimony concerning his previous experiences should be read by every one. He took this passenger run, with its very irregular hours—irregular even when he worked only on alternate days—because in the freight service the irregularity was so very much worse.

*The record of Miller's trips from August 25 to September 2 inclusive, shows that he arrived at Springfield on time five nights and on others from six to ten minutes late, except on the last trip before the wreck, when he was 42 minutes late. On the southbound trips he reached Stamford on time one day and on the others considerably late, the greatest delay being 2 hours 31 minutes, on September 1, when he had left Springfield nearly two hours late.

THE NORTH HAVEN COLLISION.

IN another column we report quite fully the hearing on the North Haven wreck. So prominent an accident must be fully recorded. But the broad lessons of this are exactly like those of many previous collisions. The New Haven road has, for years, been running fast trains close together in foggy weather without distant signals. This puts a severe strain on the engineman—except on those individuals who have the peculiar temperament and grit needed for such a job—and a good engineman has now broken down under it; passengers are killed and the road pays a great penalty. But the essential public question is just the same that it has been for years. To agree with this the reader only has to recall a half dozen prominent collisions; those at Tyrone, Stamford, Western Springs, Corning, Kinmundy and Batavia; and the derailments at St. Johnsville, Monmouth Junction and Westport.* These and many more like them have, with a frequency which it would seem ought to be sufficient, reminded everybody of the delicate, important and vital functions which have to be performed by the engineman. The superiority of steel cars over wooden is an important matter; and the question of audible signals and automatic stops also must be kept in mind; but the great and immediate question is that of training enginemen to be vigilant. This question is immediate because every superintendent knows that not all of his enginemen measure up so near to 100 per cent. as he would like; and it is great because improvement of the enginemen is the only remedy that can be applied without delay. To introduce mechanical adjuncts takes much time, as well as money. To reduce speed or to make arbitrary rules requiring trains to be frequently stopped, as a safety measure, is an injustice to the public, so long as any other resource is available.

As for the New Haven road, the facts given in our report are their own commentary. The lack of distant signals is not the only lack. Many weaknesses in discipline were shown, but those which were most emphasized by the government and by the newspapers have but an indirect bearing on this case, or none at all, and their discussion here would only becloud the main issue. The flagging was utterly inefficient, and it goes without saying that where the flagging rule obtains the flagman ought to obey it in the spirit in which it is intended. But block signals and enginemen have got to get along, in some way or other, without

*Pennsylvania	Tyrone, Pa.	July 30, 1913	Rear collision
N. Y. N. H. & H.	Stamford, Conn.	June 12, 1913	Rear collision
C. B. & Q.	Western Springs	July 14, 1912	Rear collision
D. L. & W.	Corning, N. Y.	July 4, 1912	Rear collision
Illinois Central	Kinmundy, Ill.	June 22, 1912	Rear collision
New York Central	Batavia, N. Y.	June 13, 1911	Rear collision
New York Central	St. Johnsville, N. Y.	Jan. 25, 1910	Derailment
Pennsylvania	Monmouth Junction	Nov. 17, 1911	Derailment
N. Y. N. H. & H.	Westport, Conn.	Oct. 3, 1912	Derailment

depending in every little irregularity of train movement on the flagman, or else the problem of improving block signals and enginemen must continue to be a pressing one. Officers of the road presented some poor excuses and defenses on the witness stand, and the personal appearance of some of their subordinates was not creditable to those officers who select and promote employees. But a new management is now engaged in a strenuous effort to correct the faults of the past.

The North Haven case is like that at Western Springs, in that there was no distant signal. The new superintendent (following the practice, since the former disasters, of having personal interviews with enginemen) had told Engineman Miller that reducing speed (and losing time) to find signals in fog was not only approved, but required; but Miller made the mistake, notwithstanding. Can it be that his own personal ambition to make time, regardless of the requirements of the company, was the unconscious influence that caused him to disregard the superintedent's admonition? It is not at all unlikely. That habit of mind was of long standing, while the superintendent's proposal was in a sense new. We all know how brakemen—and some conductors—will take risks to do what they deem a creditable job, in spite of orders to avoid those very risks. Fair weather schedules—speeds that cannot be made in fog—will always contain an element of danger; certainly on lines where trains are frequent and fast.

But in every one of the other accidents mentioned above, there were adequate visual signals, home and distant. A distant signal does not cure all kinds of carelessness. Miller, asked if the signal system would be better with distant indications, replied, "Gentlemen, if there had been a distant signal, you would not be here." That thought may be some slight solace to him; but no railroad manager will venture to pin his faith to that alone. Reflection on the circumstances of this and the other cases which have been referred to, and on the fact, brought out at the New Haven hearing, that New Haven enginemen, notwithstanding their good records in past years, break the rules regarding stop signals and neither report the cases themselves nor get found out by their superiors—these things reinforce the lesson that for engine runners only the very highest perfection of discipline is adequate. Miller would grade as a good man, but he had not had much discipline. Road foremen of engines had ridden with him only a very little or none at all. The officers' good opinion of him was based largely on negative knowledge. The eight trainmasters of this division have each several hundred men to look after, and cannot train or even watch, with much effect, the individual employees. The trainmaster has to depend on what assurance he can get that a man has trained himself or has been trained by some associate. To have conductors and enginemen who can be called really trained—trained by a fully competent and approved trainer, the New Haven apparently needs several times as many trainmasters and road foremen as it now has. The new officers tell of large numbers of meetings for instruction, and of lectures, and also personal interviews, but still they deal in generalities, except as to the personal interviews. Perhaps they have not yet found the time, the resources and the men to get any farther; but it is quite evident, from the facts as given out, that for the superintendents of divisions to *know* how efficient and reliable their individual employees are, they would have to employ many more subordinate officers and inspectors than are now available. Is not this quite true of many roads other than the New Haven? And is there any entirely satisfactory way of learning the capabilities of an engineman or a conductor except by seeing him do his work? "Seeing" means, of course, frequent inspections until the employee has reached the point where he can be classed as tried and true.

In the investigations which have been made of the accidents noted above, and of others, the *general* question of discipline and training of enginemen has been left in large measure obscure. Howsoever much was brought out concerning those particular cases, observers who wondered how many other runners on that road were of equally uncertain quality were obliged to keep on wondering. Neither the government nor any other power has made more than a superficial investigation. Is it not to the advantage of every railway management to let the public know something about this feature of its internal affairs? At all events, it is safe to say that if the superintendent has reasons for not letting the public know how minutely or effectively his men are trained, it is well worth while to examine those reasons very thoroughly, to see if they are sound ones.

In requiring superintendents to get along with too few or too cheap trainmasters or road foremen of engines, the New Haven road is not alone. The need of positive knowledge as contrasted with negative knowledge concerning the capability of employees, is felt in many railway offices. But the North Haven collision emphasizes the importance of one branch of "negative" knowledge, namely, surprise checking. There had been none of this on the New Haven recently, and that which was had in former years was not satisfactory. No one who is well-informed is unmindful of the criticisms of this kind of inspection, and of the alleged unfair and even dangerous things that have been done in its name; but the faults are not incurable, and the fundamental principle not only is just, but should receive the commendation of well-meaning employees. Whatever the difficulties, every railroad superintendent is bound to know all that it is possible to know concerning the work of every one of his enginemen.

BANKING INFLUENCE ON RAILROAD MANAGEMENT.

J. P. MORGAN & COMPANY have notified the New York, New Haven & Hartford of their intention to terminate within 90 days the agreement by which the Morgan firm has been the sole banker for the New Haven. Immediate interest, of course, is aroused as to whether this has any important bearing on the position of New Haven security holders. To put it frankly, the question arises as to whether the Morgan withdrawal is due to any belief on the part of the bankers that the New Haven's financial position is unsound. Without having any further information than is afforded from the New Haven's own accounts and from the history of the Morgan firm's relations to its railroad companies, there does not appear to be the slightest ground for believing that the termination of the agreement by the bankers is prompted by any fear of future New Haven financial difficulty. It is quite conceivable that New Haven stockholders may have to face a further reduction in their dividend rates. A recent statement given out by Mr. Elliott clearly suggests such a possibility; but that New Haven debenture and bondholders are in any unprotected position is almost unbelievable.

The official statement given out by the banking firm that its withdrawal was due to a desire to leave the new management under Mr. Elliott free to make whatever new arrangements they saw fit would be probably not only correct in itself, but also comprehensive, if it were amplified by the statement that J. P. Morgan & Co. are sensitive to the criticism that has been leveled against them in connection with the underwriting of the new $67,000,000 New Haven debentures. In this matter, which is unaffected by the notice of withdrawal, the bankers received a commission of 2½ per cent. for their services as underwriters. On the face of it, this commission does not appear to be excessive. Morgan & Company have always stood behind their roads, even when they were in far worse difficulties than anything that one can see in the New Haven situation. They stood behind the Southern Railway when only a very conscientious as well as a very strong banking house could have done so. They failed to stand behind the Erie at its time of crisis, only because the Erie had nothing which it could pledge, and a conservative banking house can hardly be blamed for refusal to lend money on an entirely unsecured note.

Assuming that this termination of the banking agreement does not portend any possible danger to New Haven security holders, are these security holders going to gain anything by it?

Can the New Haven do its financing any cheaper by shopping elsewhere? There are only a few of the largest banking houses that could possibly undertake the New Haven financing. Kuhn Loeb probably could and might be willing to if the New Haven directors asked it, but the bankers would not themselves seek the business. Lee Higginson, or Kidder Peabody might be able and willing to undertake the financing of the company, or the New Haven directors might decide to sell each issue of securities to the banking house that would pay the highest price at that particular time and for that particular security.

This brings up the question of the effect of bankers' relations with railroad companies in general. Morgan & Company were criticized because members of the firm were on the New Haven board of directors when the directors decided to make the agreement appointing Morgan & Company as sole financial agents; but an agreement between a railroad company and one of the large wholesale banking houses, either expressed or implied, is the rule rather than the exception. It is not known that the Pennsylvania has any agreement with Kuhn, Loeb & Company which would prevent the railroad company from selling its securities wherever it could get the best prices for them; but the simple fact of the matter is that the Pennsylvania does not go about shopping its securities, and probably it does not believe that this is a sound policy. The Goulds and B. F. Yoakum have followed a general policy of shopping the securities of their roads around among any bankers that would give them the best price, and the Gould roads' credit at the present time, and the inability of the Frisco to refund maturing notes are both at least in some part the result of this policy. Strong banking support is as necessary to a railroad company as it is to a merchant doing a very large credit business.

On the other hand, banking influence on railroad management has not always been in the best interests of the best railroading. The Morgan influence on the management of the Southern Railway, the Erie, the New York Central & Hudson River and the New York, New Haven & Hartford has not been without its undesirable features. If a railroad president holds his position because he is the choice of the road's bankers, there is the risk that his feeling of loyalty to them may, under certain circumstances, affect his judgment when that judgment should be solely guided by his duty to the road's security holders.

This question of the relation of bankers to corporate management is of far-reaching importance. Within recent years public utility corporations and industrial concerns as well as railroads have gone to the private banking houses for tremendous sums of money. Industrial concerns that were built up by individual business men have been incorporated, the individual owner has sold all or a large part of his interest, and the ownership of these corporations has been distributed to the public by the banking and bond houses. To protect themselves and their clients the bankers have retained representation on the board of directors. The boards, therefore, not only of railroad companies but of public utility and of a great number of industrial concerns, contain representatives of banking interests, and it depends very largely on the ability and moral standing of the banking houses as to whether or not this representation shall be an influence for good or for bad.

Banking influence which demands of a railroad, public utility corporation or industrial corporation president that he make a good showing in a particular month or series of months to influence the sale of securities, is unqualifiedly bad. It may be a necessary evil; that usually is the ground on which justification of such action is sought. If the director or directors representing bankers on a railroad board confine their efforts entirely to the legitimate one of protecting the interests of their clients to whom they have sold securities, through an enforcement of conservative views in regard to new financing, extensions, etc., they perform an important and highly desirable function; while the ability of the road to raise new capital in times of bad security markets as well as good, because of the banking interest in the directorate, is a valuable asset to the railroad.

Contrary to popular belief even among generally well informed men, the danger that lies in the domination of a banking house in the board of directors of a railroad company is not that the bankers, as directors of the road, will sell themselves securities at too low a price, but that they will, consciously or unconsciously, exert an influence on the operation of the property which is harmful because either ignorant or narrow. The bankers understand better than any one else the ethics of their own profession. When as railroad directors they pass upon the price at which the company ought to and can sell its securities, they are giving the railroad company the service of experts, and if this price were to be too low, they would be doing a conscious wrong act which they could not conceal from their own associates and one that is condemned utterly and absolutely by the ethics of their profession. There have been bankers who have abused the dual relation created by their being members of the board of directors of a railroad company, but the instances are comparatively rare.

When, however, the banker, sitting on a board of directors, or in talking over the situation with the railroad president whom he has been influential in selecting, urges his views as to the management of the property—of the showing which should be made by arbitrarily cutting down expenses to improve the position of the preferred stock preparatory to an issue of bonds, for instance—there is a very real danger that the best interests of the property will suffer. The remedy for this danger is in the cultivation of a public opinion among bankers, railroad men and educated people that will condemn as unethical this sort of interference and will demand the selection of railroad presidents who will be strong enough in the courage of their own convictions to follow their own judgment even where it differs from banking interests on the board of directors.

FUNDAMENTALS OF VALUATION OF PUBLIC UTILITIES.

IN discussion and action regarding matters of great public importance it is wise frequently to get down to fundamentals. Among the questions of public importance to the fundamentals of which it is now expedient to get down is that of valuation of public utilities. The Interstate Commerce Commission has entered on the preliminary work of making a valuation of all common carriers doing an interstate business. The purposes of the valuation are not specifically stated in the legislation providing for it, but they are well known. The main one is to establish a basis for the regulation of rates. An important auxiliary purpose is to establish a basis for the regulation of the issuance of securities. Much is being said and written about the general subject of valuation for these purposes, and especially the former, which shows that some of those doing the talking and writing ignore or do not know the origin, and the history of the development, of the theory of valuation. Yet in order that the subject of valuation may be intelligently discussed, and that valuations may be made which will serve the purposes for which they are intended, it is essential that the origin and growth of the theory, and the principles involved in it, should never be lost sight of.

The seed from which the entire theory of valuation of public utilities and all the valuation projects have sprung up is the principle laid down by the Supreme Court of the United States in the Nebraska rate case in 1898 that "the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public." The court stated the same principle in but slightly different language when it said in the San Diego Land and Town case, "what the company is entitled to demand

in order that it may have just compensation is a fair return upon the reasonable value of the property at the time it is being used for the public."

It helps to an understanding of what the court meant to revert to the provisions of the federal Constitution from which the principle stated by it was deduced. The Fourteenth Amendment to the Constitution prohibits any state from taking property without due process of law and from denying to any person within its jurisdiction the equal protection of the laws. The Fifth Amendment prohibits the federal government from taking private property for public use without just compensation. The due process of law and equal protection of the laws which the Fourteenth Amendment requires the states to observe are interpreted to require them, just as the Fifth Amendment specifically requires the nation, to pay just compensation when private property is taken for public use. It is these provisions which protect the property owner, when his property is taken from him in the exercise of the power of eminent domain, from having it taken without payment to him of its fair value. And it is these same provisions which are the real foundation of valuation of public utilities for the regulation of their earnings and rates. The courts have reasoned that while public utilities render a public service their property is as private in its ownership as the farmer's land. Therefore, the public could not condemn and take the property of a public utility, any more than it could the farmer's land, without paying just compensation for it. When the earnings of a public utility are reduced by regulation of its rates its physical property is not actually taken from its owners. But the regulation is by and for the benefit of the public, and if the rates fixed are so low as to deprive the owners of a reasonable return, then, in proportion as the return is reduced below what is reasonable, the value of their property is taken. But to confiscate the value of the property for public use is equivalent to confiscating the property itself. Therefore, it is unconstitutional. In other words, the constitutional provisions and principles which protect the farmer from having his farm taken for public use without just compensation are precisely the same as those which protect the railway from having its rates so regulated as to deprive it of a fair return on the fair value of its property.

Since the purpose of these constitutional provisions is—among other things—to secure to the farmer when his property is taken under the power of eminent domain compensation representing its fair value, and to secure to the railway when its rates are regulated compensation representing a fair return upon the fair value of its property, it would seem to follow that so far as may be practicable fair value should be given the same meaning, and should be arrived at in much the same way, in the one case as in the other. And this apparently is the view taken by the federal courts in the important railway rate cases involving the question of confiscation. When property is taken under the power of eminent domain, the value on which the compensation paid for it must ordinarily be based is its value at the time it is taken. The amount which it has cost its owner may be considered in the endeavor to ascertain its present value; but it is the payment of its present value, and not of what it has cost its possessor, which constitutes just compensation. On the same principle the valuation of a public utility to establish a basis for the regulation of its rates must, it would seem, be based on the present value of its property. That this is the correct legal view certainly seems to be a just inference from language repeatedly used by the federal courts. As already indicated, the origin of the theory of valuation is to be found in the decision of the Supreme Court of the United States in the Nebraska rate case. The opinion of the Circuit Court in this case, which subsequently was sustained by the Supreme Court, was written by Justice Brewer, and it is significant that in this opinion Justice Brewer said: "Now, if the public was seeking to take title to the railroad by condemnation the present value of the property, and not the cost, is that which it would have to pay. In like manner, it may be argued that when the legislature assumes the right to reduce rates the rates so reduced cannot be adjudged unreasonable if under them there is earned by the railroad company a fair interest on the actual value of the property." And repeatedly in later cases the federal courts have indicated that the underlying principles involved in valuation for the regulation of rates are substantially the same as those involved in valuation for the purpose of taking property under the power of eminent domain.

Within recent years, and especially within recent months, an increasing number of writers has been advocating valuation based chiefly on "original" or "actual" cost. The "actual cost" theory in one form is outlined in the article by Hammond V. Hayes, which is published elsewhere in this issue. Some writers apparently take the view that valuation should be based chiefly or almost entirely on the actual cost of the property. Others think that investors are entitled to a fair return year by year on all that they have invested; and that if, on the average, they have failed to receive a fair return the difference between the amount of return that they should have received and that they have received should be added to their actual investment to make up the total valuation. The "actual cost" theory has a strong attraction for those who have grown to believe that the public as a whole, and not individual members of it, should benefit by the "unearned increment" in land; and there is, of course, a vast amount of this unearned increment in the real property of railways. While the actual cost theory has been skilfully presented, and has been accepted by many persons, it seems open to objections of the most destructive character.

In the first place, originally the present value theory was advocated by those who sought to reduce railway rates, the reason being that at that time the prices of materials and supplies, the wages of labor and the value of land were so depressed that it was assumed that the cost of reproducing the railways then would be less than their original cost had been. It seems most unfair to advocate the reproduction theory when its adoption would operate to the disadvantage of the railways, and to oppose it when its adoption would, apparently, operate to their advantage. In the second place, while it might be equitable and desirable for society to adopt the single tax doctrine, thereby appropriating all increment in the value of land, it seems both inequitable and inexpedient to apply the doctrine to certain forms of property while failing to apply it generally. Why should the public confiscate the unearned increment of the stockholders of railways and not appropriate that of owners of city real estate, of mines and of farms? Finally, as already intimated, the actual cost theory appears to have no standing in law. In the San Diego Land and Town case it was contended by the company, whose water rates had been reduced, that in considering the reasonableness of its rates the court should give preponderant weight to the cost of its plant; but the Supreme Court said, "What the company is entitled to demand in order that it may have just compensation is a fair return upon the reasonable value of the property at the time it is being used for the public." So the court said in its opinion in the Consolidated Gas case in 1909, "We concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property which legally enters into the consideration of the question of rates has increased in value since it was acquired the company is entitled to the benefit of such increase. This is, at any rate, the general rule." So in its recent decision in the Minnesota rate case, the Supreme Court plainly proceeded throughout on the assumption that valuation for the regulation of rates should be based on the present value of the property. It differed from the counsel and witnesses of the railways, and from most engineers, in regard to the way that the present value should be ascertained, but that the present value was the thing to be ascertained it clearly indicated. The point on which it differed most radically from railway men and engineers related

to the way in which the valuation of land should be made. It is a familiar fact that it costs a railway more than the ordinary market value of land to acquire for railway purposes. Proceeding on the reproduction theory of valuation, most engineers had adopted the view that, since experience shows that land used for railway purposes would, if it were going to be acquired, cost more than its market value, it should be included in the valuation at more than its market value. While the Supreme Court apparently held that the land should be included merely at its market value for ordinary purposes, it is significant that it said, "the property is held in private ownership, and it is that property, and not the original cost of it, of which the owner may not be deprived without due process of law."

It would seem to follow, then, that, so far as may be practicable, valuation for the regulation of rates must be made in the same way as valuation would be made if it were intended to condemn the properties of the railways and take them under the power of eminent domain. There is, however, one extremely important difference between valuation for the purpose of rate regulation and valuation for the purpose of condemnation. When a valuation is made for the purpose of taking property under the power of eminent domain, one of the principal factors ordinarily considered is the earning capacity of the property; and the net earnings are, of course, the best index of a property's earning capacity, and therefore, of its market value. But in the valuation of a public utility the purpose is to ascertain the ratio of the net earnings to the value of the property as a means of determining whether the utility's rates are reasonable. Obviously, in a valuation to find out whether net earnings are reasonable, net earnings cannot be used as a main factor in the valuation. Therefore, the estimate of the present value of a public utility must be based chiefly on what it would cost to reproduce its property in its present condition. This is a very different thing from basing the valuation chiefly on the actual cost of the property.

The fact is, that the actual cost theory is based on the premise, not that the owners of public utilities are entitled to a fair return *on the fair value* of their properties, but on the ground that they are entitled merely to what is considered a *fair return;* and the assumption is that if the owners receive, let us say, 5, or 6, or 8 per cent. on their actual investment throughout the entire life of the enterprise, they are getting a fair return. But this is not at all the principle repeatedly laid down in the courts. The principle laid down by the courts apparently is that public utilities are entitled, whenever their rates are regulated, to have the fair value of their properties ascertained, and to have their rates so adjusted as to cause them to receive a fair return on their value at that time, whether that value be more or less than the cost of the property. In rendering the opinion of the Circuit Court in the Nebraska rate case, Justice Brewer intimated that there might be reasons why valuation in a rate case ought to be made even more liberal than in a case involving the condemnation of property. "Is there not," he said, "an element of equity which puts reduction of rates in a different attitude from the absolute taking of the property by virtue of eminent domain? In the latter case, while only the value is paid, yet that value is actually paid, and the owners may reinvest and take the chances of gain elsewhere; whereas, if the property is not taken the owners have no other recourse than to receive the sum which the property they must continue to own will earn under the reduced rates."

The application of the present value theory, when the present value exceeds the cost of the property, may seem to be unjust to those who pay the rates; but is its application in these circumstances any more unjust to the rate-payers than it is to the owners of public utilities when the present value happens to be less than the actual investment? The making of a valuation based entirely on present value presents great difficulties; but does it present any greater difficulties, in the case of most railways, than would the ascertainment of their actual cost?

Letters to the Editor.

ENGINE HOUSE PAY.

New York, August 19, 1913.

To the Editor of the Railway Age Gazette:

The engine house has been subject to much abuse, and not only is it accused of engine failures that properly are chargeable to the transportation department, but a policy of wasteful economy stifles all attempts at improvement. Roughly, men are paid for two things—brains and brawn, graded between foreman and laborer; the general foreman is paid for executive ability and knowledge, the mechanics for both skill and physical exertion, and the laborers for toil alone. To promote proper respect for the man in charge of perhaps a million dollars' worth of company property, his salary should exceed that of any of his subordinates, yet there are engine houses in which the hourly rate of certain mechanics gives them a larger remuneration than their superiors who are on a monthly salary.

Again, there are engine house men who have served a score of years with no increase in their hourly rate, yet all this time they have been storing up experience and educating themselves for more responsibility, the latter being gladly given to them, but not more pay. Indeed, raw, untrained helpers are received upon the pay roll at precisely the same rate that is given to these older men. No policy could be more conducive to dishearten men or to create a feeling that the company is ungrateful. I recall a man who started at the lowest rate as a laborer 22 years ago. During this long period of continuous service he has acted as doper, wiper, ash pit shoveler, fire cleaner, hostler, and as mechanic's helper, and has performed or is familiar with almost every duty in the round house. Surely his services are worth more today than are those of a new man, yet he still draws the lowest laborer's rate. If a foreman, acting through his master mechanic, only had the authority to adjust the rates of pay so that the lower employees would be treated like human beings rather than mere numbers in the pay master's book, I believe a big problem in round house efficiency would be solved. —*Terminal Foreman.*

Railway Coal Depot in Southern France.—The Paris-Lyons-Mediterranean Railway, generally known as the P. L. M., is considering transferring its principal coal depot in southern France from Marseille to Port Saint-Louis-du-Rhone, 30 miles distant. This would mean a material reduction of traffic at Marseille, as the P. L. M. is much the largest coal importer in the district. This company received at Marseille during the last three years an average of over 450,000 tons of foreign coal, or about 30 cargoes each year. All these supplies were purchased through the company's headquarters in Paris.

Steel Cars in the Tropics.—It has, hitherto, been considered inadvisable to operate steel passenger cars in tropical countries, because of the climatic conditions which prevail there, and in adopting a new type of all steel cars for passenger service the South Indian Railway would seem to be embarking upon a policy which has, up to the present, remained untried. Although the cars are of steel construction, every precaution has been taken in designing them to avoid the risks and inconveniences which otherwise would have been experienced. The tests made with the cars have shown remarkably good results. In the matter of internal temperature some very satisfactory results have been reached, a saving in weight, as compared with the latest wooden cars of the same dimensions, has also been effected. This saving would undoubtedly have been exceeded had the designers preferred not to make too sudden a departure from existing standards. It is interesting to note that several other railways in India and Egypt have placed orders with the manufacturers of these South Indian Railway cars for steel coaches.

MOUNTAIN RAILWAY ELECTRIFICATION.*

A Study of the Tehachapi Pass on the Coast Lines of the Southern Pacific in California. A Busy Line with Heavy Grades.

By Allen H. Babcock,
Electrical Engineer, Southern Pacific.

During the past ten years the Southern Pacific has investigated the question of electrification of its three outlets from the central valleys of California, north over the Siskiyou mountains, east over the Sierra mountains, and south over the Tehachapi Pass. The earlier reports, inspired directly or indirectly by manufacturers as a part of their propaganda program, were favorable to electrification. The railway company then began studies of the subject, independently. The conclusions of its officers were unanimously opposed to electrification, by reason of the financial results to be anticipated; however, some of its lines have been electrified, and other electric lines have been acquired for good reasons.

Lately there has been a constant and persistent pressure put upon the company officials, both by power companies and consulting engineers, to reconsider decisions adverse to electrification. Just how much of this agitation has been due to the application of general statements regarding the benefits to be secured by electrification of the particular problems presented by west coast mountain railroading is hardly susceptible of direct determination. It is possible, however, that much of it is due to the effect that such hypothetical studies and papers as have been published recently have produced upon executives, who, however skilled they may be in their specialties, only in rare instances are sufficiently experienced technically to be capable of forming independent opinions on engineering matters. It is a fact that reports adverse to electrification in the hands of these same executives often cause disappointment and sometimes arouse criticism.

Here, then, are two opposing parties: the one with things to sell (apparatus, power, engineering skill), the other with a service to be maintained, at decreased cost if possible, but necessarily maintained at any cost; the first reports favorably upon projects that the second considers unfavorably with equal positiveness. Some things must be unknown to both. Either the radicals have not all the facts upon which to work, or the conservatives cannot interpret their facts correctly.

This paper is written, not with the intent to offer anything original in the study of such problems, but to give the facts of a typical west coast mountain railroad district and their interpretation as seen by one whose reports heretofore have been responsible for many adverse decisions in such matters. It is not intended to be the final word on the subject of electrification of this district, but it is the result of a study recently made to determine whether there was such a reasonable chance for profitable electrification as would warrant a very considerable expense in time and money.

Physical Characteristics.

West Slope, Bakersfield to Summit	49½ miles
Vertical rise	3,764 ft.
Average grade	1.44 per cent.
Average curvature equal to a constant 3 deg. curve.	
Total curvature, 7,944 deg., of which 6,969 deg. are between Caliente and Summit (27.2 mi.). The loop curve has a total curvature of 566 deg. 33 min. 12 sec.	
East Slope, Mojave to Summit	18.3 miles
Vertical rise	1,285 ft.
Average grade	1.33 per cent.
Average curvature (as above)	0.79 deg.
Total curvature	765 deg.

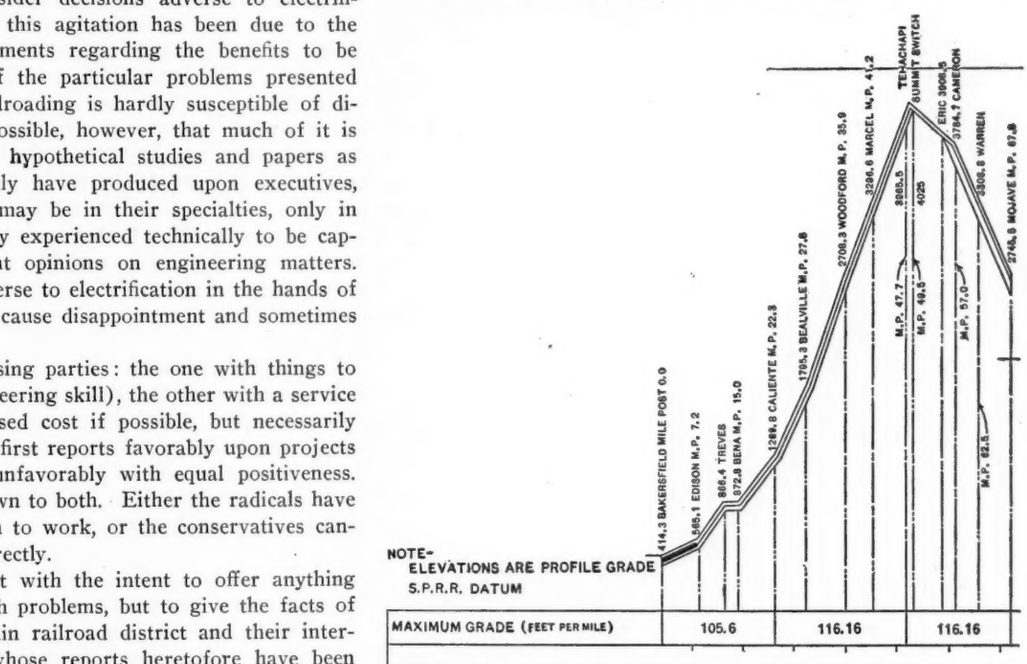
The ruling grade on each slope is 2.2 per cent., but these grades are not compensated for curvature so that in effect the ruling grade is 2.4 per cent. The maximum grades are long enough to fix the weight and power of the locomotives. The average distance between sidings is approximately three miles.

*Abstract of a paper presented before the American Institute of Electrical Engineers, at a meeting held in Vancouver, B. C., on September 9-11, 1913.

In determining the energy consumption of trains moving over the mountain the actual characteristics of the line were used, but in determining load diagrams and substation spacings and capacity, the following close approximations were made to take care of the ruling grade, curves, etc.

Section.	Miles.	Average grade.
Bakersfield to Edison	7.2	0.5 per cent.
Edison to Caliente	15.1	1.5 per cent.
Caliente to Summit	27.2	2.4 per cent.
Mojave to Cameron	10.8	2.4 per cent.
Cameron to Summit	7.5	0.75 per cent.

The average freight train, eastbound, weighs 2,000 tons, exclusive of locomotives. Four consolidation type locomotives, or their equivalent in Mallet compounds, are used to haul this train from Bakersfield to Summit. From Summit to Mojave one locomotive is used for supplying air for brake purposes, etc., and the



MAXIMUM GRADE (FEET PER MILE)			105.6	116.16	116.16
CURVED LINE (MILES)	FROM 0°TO 6°INCL.		11.34		6.44
	" 6°01 " 8° "		2.38		
	" 8°01 " 10° "	7.67	2.83 OF 10°01 & OVER		
TOTAL ASCENTS EAST (FEET)			3686.885		5.5
" " WEST (")			76.885		1285.03
TOTAL CURVATURE			7944°		76.5

Condensed Profile, Tehachapi Pass.

other three return deadhead to Bakersfield. The westbound freight trains are lighter than the eastbound on account of the fact that much of the western movement consists of empty cars. The normal weight is 1,250 tons, hauled by three consolidation locomotives, or their equivalent in Mallets; or a 1,500-ton train operated by three consolidation or decapod locomotives, or their equivalent in Mallets. The helper engines cut out at Summit and return light to Mojave. In order to provide a flexible unit it was proposed to use an electric locomotive, capable of handling a train unit of 500 tons, as many per train to be used as the weight of the train requires. The weight of the electric locomotives is assumed at 100 tons.

Passenger train weights vary from 250 tons to 600 tons, for which a single passenger locomotive weighing 150 tons was pro-

vided. A maximum freight train movement over the mountain recently consisted of twelve full-size freight trains, eastbound, and eight full-size freight trains, westbound, in addition to the normal passenger movement, which is seven regular trains each way per day, with occasional extras and second sections.

The track, particularly on the west slope, is laid for the greater part of the distance in rough country. In fact between mile posts 326 and 361 all the track, with the exception of a short stretch near Caliente, is in cuts or on fills. It may be said generally that at least half the track is laid in conditions where any overhead contact system would require, necessarily, very expensive steel pole or bridge construction. In addition to the above, there are 18 tunnels, in none of which the vertical clearance is more than 18½ ft., and 60 per cent. of their total length is on 10 deg. curves.

Experience with similar earlier reports has shown that, in general, there is little difference in total first cost and annual operating costs, whether an overhead system or the third rail system be considered. A double overhead contact system gives maximum first cost and operating costs for contact system, and minimum weights, costs and maintenance of locomotives; a single overhead contact system gives high first cost and operating costs for contact system, with maximum weights and maintenance of locomotives; the third rail gives high first cost and minimum operating cost of contact system, medium locomotive weights and first costs, with minimum operating costs, but the total costs are brought up to the level of the others by reason of the necessary substation apparatus and attendance. A choice of systems therefore is to be made only after an exhaustive study of all the local conditions. In a preliminary study, as this is, it matters little what particular system of propulsion is chosen, upon which to base the estimates. For the purposes of this discussion a 2,400-volt continuous-current, third-rail contact system was selected for the main line, with an overhead contact system in yards and terminals, at Kern, Bakersfield and Mojave.

In the following, the first costs are based on the present traffic as shown by the train despatcher's sheets; the annual operating costs are taken from the reports of the fiscal year ending June 30, 1912, for steam operation, while the same traffic and reports are used, as far as they apply, in estimating the costs for electric operation.

FIRST COSTS.

Substations	$1,610,000
Generating station	1,760,000
Transmission system	430,050
Contact system (yards)	155,250
Contact system (line)	825,000
Bonding	122,300
Block signals	175,000
Shops and inspection shed	10,000
Electric locomotives	2,085,000
Total	$7,172,600
Credit by steam locomotives released for service on other divisions	1,464,900
Net first cost	$5,707,700

ANNUAL OPERATING COSTS.
(Steam-generated power.)

	Steam.	Electric.
Substation labor and supplies	.....	$59,700
Power house labor and supplies	.....	84,780
Transmission and contact system maintenance	.....	36,576
Maintenance of way as affected by locomotives	$126,890	83,285
Locomotive repairs	270,990	70,701
Locomotive enginemen (passenger)	48,300	29,100
Fuel	240,852	100,530
	$687,032	$464,672
Bond interest at 4½ per cent	.....	256,847
Totals	$687,032	$721,519

Net loss, $34,487

In the above no account is taken of items not affected by the character of motive power: freight enginemen, and all train crew wages, repairs to cars and maintenance of way as affected by cars—for example.

The net loss under proposed electric operation is so small that it might be wiped out by a reasonably small change in the assumptions; in fact, at this stage of similar investigations often there is a temptation to search for opportunities to change this, or to modify that, as the necessities of the case demand. This important fact should be borne in mind, however, that in the foregoing no account is taken of taxes and depreciation, both of which must be paid, some time, by some one, to the extent of at least 5 per cent. of the net investment, which increases the net loss by approximately $285,000 per year.

It may be asked, why is depreciation not taken into account in the usual manner? The answer is, since there is a loss, or at least no profit shown, and since to add depreciation would be to make a bad matter only worse, nothing is to be gained by entering into the academic discussions that inevitably follow the opening of a subject concerning which opinions reasonably may differ as widely as on this much disputed particular.

But power may be purchased, as is often suggested by those with power for sale, hence it is proper to determine at what rate this power may be purchased and come out even as compared with operation by steam-generated power. Obviously any rate less than this will be profitable.

With purchased power, the total investment will be diminished by the costs of 20 miles of transmission line and of the generating station, it being assumed that power will be delivered at some one point on the right-of-way, whereas local conditions located the steam station 20 miles off the right-of-way at a point six miles east of Bakersfield where there is a large oil field from which the company obtains much of the fuel oil used in its locomotives. Plenty of water for condensing purposes is obtainable near by. The annual charges on a transmission line under these conditions do not impose so heavy a burden on the operating costs as would the delivery of oil at the right-of-way; besides, to develop sufficient water along the track would cost a great deal.

The net first cost was		$5,707,700
Transmission line	$120,000	
Generating station	1,760,000	1,880,000
Leaving a net investment with power purchased		$3,827,700

ANNUAL OPERATING COSTS.
(Power purchased.)

	Steam.	Electric.
Substation labor and supplies	.....	$59,700
Transmission and contact systems maintenance	.....	35,576
Maintenance of way as affected by locomotives	$126,890	83,285
Locomotive repairs	270,990	70,701
Locomotive enginemen (passenger)	48,300	29,100
Fuel	240,852	.....
	$687,032	$278,362
Bond interest at 4½ per cent	.....	172,247
Totals	$687,032	$450,609

The difference, $236,423, should be decreased by $191,385 (the approximate tax and depreciation rate of 5 per cent. on the net investment of $3,827,700), and there is left the wholly inadequate sum of $45,038 with which to purchase 53,000,000 kw.-hr. at a load factor of about 20 per cent.; with no profit to show for an investment of nearly $4,000,000.

For the sake of the argument let the depreciation be neglected and let it be considered that $236,423 are available for the purchase of power under the operating conditions of the service. At any time there may be four passenger and four freight trains pulling up hill simultaneously, taking a total of 32,720 kw. alternating-current input to the line. This is not the maximum number of trains that is on the mountain regularly, but represents only those taking power. A slight derangement of schedules, or an extra freight movement, of citrus fruits or oil, or a blockade, for example, will cause congestion beyond any possibility of estimating. This traffic must be handled as circumstances require. It cannot be spaced conveniently for power demands, as many engineers and power men have suggested, but the terminal yards must be cleared as the cars accumulate. This amount would net about 4½ mills, a rate that neither the purchaser nor the seller could afford to consider.

In the face of the foregoing it is difficult to see how any

recommendation in favor of electrification can be made, if the opinion is based on the direct financial profit to be realized; in other words, this case is merely another example of the fact, often noted, that in the great majority of cases the profits from electrification must be realized indirectly rather than directly—increased track capacity, postponing second-tracking, or the like.

At the present time the entire district between Mojave and Bakersfield is protected with automatic block signals of the usual continuous-current track circuit battery type. In case of electrification a great part of this apparatus will have to be replaced with alternating-current track circuit apparatus, because the use of track circuits with propulsion current in the rails requires selective apparatus to prevent false indications. The estimate of the signal department for making these changes is $175,000.

As the company has important division shops located already at Bakersfield, a large item for repair shops is not necessary, it being understood that the heavy electric locomotive repairs would be done in the steam locomotive repair shops. An inspection shed with pits, however, is necessary, for which the lump item of $10,000 was included, this being in the ratio of cost of the track facilities required here to the cost of similar track facilities in a shop recently erected by this company.

An analysis of the train sheets covering the period of maximum tonnage over the mountain shows that there will be required 47 freight locomotives, and 11 passenger locomotives, which includes a reasonably large allowance, namely, 8 freight and 3 passenger locomotives, for repair and shopping purposes. The locomotives required for this service are so closely similar in characteristics to those upon which quotations were asked recently from the electrical manufacturers that new quotations were not requested for the purposes of this estimate, particularly since the locomotives actually quoted on were for the same operating voltage, etc., as are contemplated herein.

The unit costs were: passenger locomotives $40,000, and freight locomotives $35,000, making a total of $2,085,000 for 47 freight and 11 passenger locomotives.

It seems pertinent here to note the very significant fact that while steam locomotives are strictly interchangeable and can be moved from division to division as the necessity for varying motive power capacity develops, by reason of crop movements, or otherwise, the electric locomotives are limited in their field of operation strictly to electrified track, and as far as interchange between divisions is concerned they might as well be of some gage other than standard. An inspection of the records of the operating department shows that during a period of heavy traffic over the mountain there were in actual service 13 passenger 47 consolidated and 13 Mallet locomotives, which, if taken at the same valuation as was used in a recent report on the Sierra Nevada electrification, would represent an investment of $1,220,750, to which should be added at least 20 per cent. for extras, shopping, repairs, etc., making the total investment in steam locomotives properly chargeable to this district = $1,464,900.

Many years' experience in the analysis of track maintenance accounts has shown that, independent of all other considerations, track maintenance as affected by rolling stock can be divided into two heads, locomotives and cars, the segregated costs of which have been determined very accurately. Reduced to dollars and cents, the auditor's accounts show that locomotives of approximately the same weight and run at the same speeds as those contemplated in this report, caused maintenance of way expense at a certain rate per locomotive mile, from which has been deduced the item, $83,285, given in the statement of annual operating costs. That for steam operation, $126,890, is taken from the records.

The figure given for locomotive repairs for steam operation is taken directly from the records. The estimated cost of electric locomotive repairs, four cents per locomotive mile, is based on our analysis of the best data available for such costs. As to this value, opinions reasonably may differ, but it probably will be recognized that the figure named gives a rather favorable consideration to the use of electric locomotives, since the repair accounts of some of the larger railroads operating the largest electric locomotives in this country show repair costs materially more than four cents, all things considered.

A PLEA AGAINST HASTY LEGISLATION.

The following telegram was sent Wednesday by presidents of Chicago railways to William C. Adamson, chairman of the house committee on interstate and foreign commerce; to Francis G. Newlands, chairman of the Senate committee on interstate commerce, and to E. E. Clark, chairman of the Interstate Commerce Commission:

The undersigned, being officers of railways whose names appear in connection with our signatures, note with concern that, because of some recent serious railway accidents, there are being proposed in congress measures intended to require railways to immediately substitute steel passenger train cars for their wooden cars and to generally install block systems, or even automatic train stopping devices.

We are but too keenly aware that the accident record of railways in the United States is unsatisfactory. We fully recognize the right and duty of congress to take any reasonable action that may be adapted to reduce the number of accidents, but we beg respectfully to suggest that the measures being advocated are in some respects too broad and in others too narrow in their scope and that, therefore, if they were adopted they would not accomplish the beneficent results desired.

As to steel cars a recent investigation disclosed 90 per cent. of all passenger train cars acquired by railways in 1912 were of all steel and steel underframe construction and that of those under construction January, 1913, no less than 97 per cent. were all steel or steel underframe construction. Railways, without legislation, are ordering all steel and steel underframe cars faster than the manufacturers can supply them; and it is estimated that even if it were practicable now to replace all wooden cars with steel cars, the cost of doing so would be $633,000,000.

As to block signals, while they are a recognized safety device, the Interstate Commerce Commission showed in its annual report that out of 49 collision accidents investigated by it, 48 had been caused by failure of some employee to do his duty and that of these, 13 had occurred on lines having block signals.

Steel cars do not prevent accidents; merely mitigate their effects; and the figures just cited show also that block signals are no specific for collisions. Furthermore, all legislation proposed deals only with train accidents; and the statistics of the Interstate Commerce Commission show that fatalities and injuries occurring in train accidents are a relatively small part of the total. They show that if there had not been a single collision in the fiscal year 1912, no less than 96.5 per cent. of all those killed on railways would have been killed anyway, and that if there had not been an accident of any kind to a single train, 92 per cent. of all who were killed would have been killed anyway.

A clear majority of all persons killed are trespassers on railway property, the number of trespassers killed in 1912 being 5,434, which was 39 times as great as the number of passengers killed in train accidents and 7 times as great as the total of all classes of persons, except trespassers, killed in train accidents.

A great many accidents, other than those in train accidents and trespassers are due, like them, not to deficiencies of the structures or equipment of railways, but to careless and reckless conduct of individuals, as clearly appears from the statistics of the Interstate Commerce Commission.

In view of these facts, we respectfully suggest that any action regarding railway accidents which congress may take should be designed to secure ascertainment of causes and application of the remedies for all classes of accidents. The fact that if, in the

fiscal year 1912 there had not been a single accident to a train in the United States, 92 per cent. of those who were killed on railways would have been killed anyway, shows that the situation would be very inadequately dealt with by legislation aiming merely to remove causes or to mitigate effects of accidents to trains alone.

Signed by

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R. H. Aishton, vice-president of the Chicago & North Western.

Darius Miller, president of the Chicago, Burlington & Quincy.

S. M. Felton, president of the Chicago Great Western.

Fairfax Harrison, president of the Chicago, Indianapolis & Louisville.

A. J. Earling, president of the Chicago, Milwaukee & St. Paul.

H. U. Mudge, president of the Chicago, Rock Island & Pacific.

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ORIGINAL COST VERSUS REPLACEMENT COST AS A BASIS FOR RATE REGULATION.*

By Raymond V. Hayes.

There is at the present time no well defined basis upon which the fair present value of the properties of public utilities shall be ascertained. The rulings which have been rendered by courts and commissions agree in but one thing, that the fair present value can be determined only by the impartial judgment of a court or commission when such a tribunal has been well informed as to all the facts and figures relating to a particular property. The courts have gone so far as to indicate the figures which are needed for their information in establishing a fair basis of this kind. Of these figures, the two which unquestionably have been considered most important by appraisers, are (1) the cost-new as of the present time, usually termed the cost of reproduction or the replacement cost; and (2) the original cost.

There are two parties directly interested in every valuation of public utilities: the users of the enterprise, who will be spoken of hereafter as the public, and the security holders. Naturally these two parties have divergent aims in the establishment of the value of the property upon which rates are to be based. The users desire that this basis shall be made no higher than is just and proper, and the security holders and managers are insistent that their property shall be given its full value as a complete operating and earning enterprise. It is common, therefore, to find much difference of opinion as to the propriety of the inclusion or exclusion of certain items of possible cost or value. Moreover, it is difficult for parties so directly interested in the decisions of the tribunal to present the various figures, representative of value, which have been demanded by the courts. As a consequence each side usually presents that figure which will be most favorable to the end desired, a high or a low present value.

Notwithstanding repeated decisions to the effect that fair present value can be established only when a knowledge of all facts and figures have been presented to the rate making tribunal, nevertheless there has grown up within the last few years a too general acceptance of the cost of reproduction as the true index of the fair value of a property for rate making purposes. This figure is attractive to the holders of the securities of public utility enterprises, for the reason that it is usually larger than the figures that might be obtained by other means. The replacement cost during recent times has usually been larger than other figures representative of value, owing to the increased cost of labor and material and to certain more or less arbitrary assumptions usually employed in the derivation of replacement cost, but more especially to the advances of late years in the values of real estate in most parts of this country.

The replacement cost is the sum of money which would have to be expended at the present time to reproduce a physical property identical with that in existence at the present time and used for the benefit of the public. In deriving it an inventory of the entire physical property must be made, and to every unit found in the plant must be applied costs representative of what would have to be paid today for the material and for the labor necessary to place the material in the position now occupied by the existing plant. The replacement cost of land is its present market value, to which must be added the expense which would be incurred in its purchase. Again, most public utilities have portions of their plant in the streets. In many places the streets have become so filled with the conduits or pipes of other utilities, since the plant under valuation was built, that an existing system could be replaced at the present time only at a far greater cost than was incurred when the plant was originally installed. Again, much of the construction of the existing property was placed in the streets before the streets had been paved or, at least, before they had been surfaced with a present higher grade pavement. In consequence of such street improvements, the cost of construction at the present time would be considerably greater. A rigid adherence to the theory of replacement costs demands that these enhanced costs should form a portion of the replacement cost.

Original cost, on the other hand, is the sum of money which was expended by the undertaking for the property now in use for the benefit of the public. It is not what the original property cost, but rather what the present property cost. It is possible that the expression "original cost" conveys a false impression and that the "actual cost" of the property now in use would be less confusing. It is most important that the original cost should not be considered to be the cost of the first unit of plant used in a particular place or for a particular purpose. Elements of plant which are no longer in use or useful cannot be considered as a portion of the property to be included in a valuation for the purpose of determining a fair value for rates. Such plant elements have passed out of existence and their cost should have been removed from the assets of the company. If the business of the undertaking had been conducted properly, reserves for depreciation should have been made. These reserves are obtained from users through the rates paid for the service. Manifestly it is unfair to the users to demand rates sufficiently high to create a fund for the replacement of obsolete plant and then include the cost of such obsolete plant in a new value upon which new rates should be based.

The original cost has been presented as a figure representative of value in but few appraisals, whereas today the replacement cost is almost always ascertained. There are several reasons for this neglect of original cost. Probably the most controlling reason is that, through a misunderstanding of the true meaning of original cost, such a figure can rarely be obtained. This misunderstanding of original cost is due to the efforts of the advocates of the theory of value based on cost to define the original cost as the stockholders' investment in existing useful property. Such an interpretation of original cost requires an analysis of the company's books, an identification of each unit of the existing plant with the book entries showing its original cost, and a determination of the source of the funds used to pay for each unit. It will be apparent to all who are familiar with the construction, maintenance, and replacement of large public utility properties that such a figure can but rarely be obtained—at best in the cases of enterprises which have been constructed but recently. In most instances plant cannot be identified by the book entries. Nor is it possible to trace the sources of all funds used in constructing the plant. Time and again attempts have been made in valuations to derive a figure representative of original cost in accordance with such a definition, and without success. The replacement cost has become, therefore, the only figure which

*Reprinted by kind permission from the *Quarterly Journal of Economics* for August, 1913. The author has been for some years chief engineer of the American Telephone & Telegraph Company, and more recently consulting engineer in valuation cases.

rests on definite knowledge of the existing property, and a figure representative of original cost has not been presented to the rate making tribunal.

The original cost has been called for by the courts as one of the figures representative of value which must be ascertained to assist the rate making tribunal in forming its judgment as to the fair present value of a property. It is a figure, consequently, of quite the same importance as that representing the replacement cost. The responsibility is upon the engineer, therefore, to find some way whereby the demand of the courts can be complied with and an accurate determination of original cost be made.

The original cost, if the above interpretation of its meaning is accepted, can be ascertained in a manner almost identical with that used in determining the replacement cost. The inventory, describing all useful property now in service, is identical for the two purposes. The unit costs will be different, however. The unit costs used in ascertaining replacement costs are, theoretically, the prices for labor and material prevailing at the date of valuation. Practically, it is usual not to take actual present prices, since such figures may have been affected by abnormal market conditions, but a figure for each unit of plant representative of a probable present cost had market conditions been normal. The unit costs used in ascertaining original costs will be the actual prices of labor and material paid by the company in each year in the past in which plant units had been purchased and installed. Thus, instead of a single unit cost for each unit, as is the case with replacement costs, there will be as many unit costs for each unit as there are years in which existing units have been purchased.

This method of ascertaining original cost is not as difficult or laborious as at first thought it may appear. The age of each unit of perishable property must be determined in every valuation for the purpose of ascertaining the loss in value of the unit due to depreciation. The present value, whether that value is based on original cost or replacement cost, is the cost-new less depreciation. The present value is the value of the perishable property in its present condition plus the value of the non-perishable property. With the ages of all units known, it is only necesssary to group together units of the same kind and age. The age indicates directly the year in which the units were purchased. The prices paid for each unit in each year in the past can be obtained readily from the books of the company or, if such records are not available, it would be rarely difficult to obtain reliable figures from outside sources. The product of the unit costs for each year, obtained in this manner, multiplied by the number of units found, by a knowledge of their age, to have been installed in that year, gives the costs for each year of the perishable property. The sum of the costs of all units for all years gives the total original cost of all perishable property. To this sum must be added the actual cost of the non-perishable physical property. The non-perishable property consists principally of land. There is usually but little difficulty in identifying the sums paid for land as shown in the company's records. To the original cost of the physical property must be added the usual overhead charges, derived in a manner consistent with the above method.

Original cost, derived in the above manner, presents no difficulties to the appraiser, is founded on a carefully made inventory, and uses unit costs freed from any assumptions. It would seem to be a figure possibly even more reliable than the replacement cost. These unit costs are actual costs; whereas the unit costs used in the derivation of the replacement value are based theoretically upon the assumption that all material and labor must be figured at the prices prevailing on a particular day, but that such prices should be not the actual prices but what they would be if the market were normal. Original cost, being actual cost, avoids the contentious question usually incident to replacement cost, whether such a figure should show the cost of plant replaced in a wholesale or in a piece-meal manner. There are many other similar points favoring the reliability of a figure representative of original cost, derived as described above, which are of interest to the expert on valuations but need not be considered here. Every consideration tends to show that the actual cost of an existing plant is a more acceptable figure, as far as the accuracy of its determination is concerned, than a figure based upon the suppositious replacement of a plant. All doubt as to the reliability of the books of the company is removed, as the inventory establishes the present useful plant and its age. The books of the company can be trusted to show what has been paid for labor and material and, even if this is doubted, market rates for labor and material for the years in question can be obtained from other sources.

It must be distinctly understood that the above arguments in favor of original cost are not intended to urge the use of that figure to the exclusion of the replacement cost. On the contrary, figures to show the replacement cost are demanded by the courts and must be prepared and presented to the rate making tribunal for its information. The point which it is wished to emphasize is that the original cost is likewise a figure of importance, which has been neglected in the past but is capable of determination with quite as great a degree of accuracy and possibly will be accepted with less controversy.

Moreover, the absence of reliable figures showing original cost has tended to affect the full and original intent of replacement cost. At the outset the demand for figures to show replacement cost arose, unquestionably, from a desire on the part of the court to know what the actual value-new of the property of the undertaking was at the time of the appraisal. The courts wanted to know what it would cost to reconstruct it at that particular time. The courts have said repeatedly that no one of the several figures, to be ascertained by the engineer as a representative of possible value, would be accepted by it in all cases as the *fair* present value-new. It is probable that the replacement cost unmodified would be accepted but rarely as that value. The present tendency, where the replacement cost is the only figure presented to the tribunal, is to change the original significance of replacement cost by using unit costs derived from an average of prices prevailing for a number of years in the past; by rejecting the cost of pavement, unless it can be proved that the pavement had been paid for by the company; by questioning whether the present value of land should be used as a portion of replacement cost; and by eliminating entirely figures representative of the value inherent in a successfully operating enterprise. These and similar modifications of the significance of replacement cost clearly indicate on the part of appraisers to obtain the original cost—the money actually expended for the existing property by the undertaking—by means of more or less arbitrary modifications of replacement cost. With an original cost accurately obtained and a replacement cost showing what it would cost actually to create, at the present time, a new and similar property, the necessity of appraisers attempting to derive a compromise figure would disappear. The decision as to how replacement cost or original cost should be modified to establish a *fair* cost-new must be made by the rate making tribunal and not by the appraisers. Competent appraisers, representing possibly divergent interests, would derive the original cost as well as the replacement cost, following the principles above enunciated, and present figures which would agree substantially. Thus, many of the controversies usual in appraisals would be removed.

The rate making tribunal thus would have two figures representative of value of the property new: the actual original cost and what the same property would cost if reconstructed today. From these two figures and from others relative to the undertaking, the rate making tribunal must assign a present value, fair to both the public and to the undertaking, upon which the return to the stockholders of the undertaking may be based. The question immediately arises as to whether the undertaking is entitled to earn a return upon the fair cost-new or upon the fair cost-new less the loss in value which may have arisen from the years that the perishable property of the undertaking has been in service.

In the case of an actual appraisal it may be found that much of the present property of the undertaking has been purchased with money derived from the public and contributed by it for the

express purpose of paying for the renewals of portions of the plant which may have become unserviceable. The investment of these funds—reserves for depreciation—in needed plant extensions is a wise plan for most successful and growing public utilities, as thereby the undertaking is required to pay a less amount as a return than would be required if new money had been obtained from the stockholders. Moreover, there would be little expense involved in obtaining new money at some later time when funds were required to pay for renewals. Clearly both the original cost and the replacement cost will include, in such cases, the cost of plant built not only with the money of the security holders, but with the depreciation reserve funds. If the reserves for depreciation had been properly made and all invested in plant, the depreciation would equal the depreciation reserves and, if the original cost-new was reduced by the loss in value due to depreciation, there would be eliminated from the original cost the cost of that portion of the plant which had been purchased with the money contributed by the public for the purpose of providing for renewals. If the reserves for depreciation had been inadequate but had been invested in plant, the present value of the property would be less than the original cost of the security holders, thereby penalizing the undertaking for improper management in not making proper reserves for depreciation. Thus it is seen that the present value derived from the original cost can only include the present value of plant purchased with the money of security holders and possibly with excess earnings. It cannot include reserves for depreciation.

Many argue at the present time, that the fair value upon which rates should be based is the money which has been contributed by the stockholders and expended by the undertaking in property now in use and useful. These advocates of the theory of "rates based on cost" would endeavor to have the original cost made the criterion of fair cost-new, provided they could be assured that in the original cost was not included the cost of plant which had been acquired with money obtained through abnormally high rates charged for service in the past. They feel that the undertaking should not be permitted to obtain returns based upon the replacement cost, particularly when a large portion of the property of the undertaking may consist of land the present value of which may exceed by a large amount its original cost. Thus in the case of many railroads, the land may have been purchased originally at a very low figure or may have been donated to the undertaking for the purpose of encouraging the building of a railroad line in sparsely settled territory.

The original cost excludes the unearned increment on land and, so far as this feature is concerned, satisfies those who object to private acquisition of the increment. Derived as above described, and with depreciation subtracted, it does not exclude the value of property acquired through excessive earnings in the past. It shows the money which was expended in the acquisition of the present property but does not distinguish between plant purchased with the stockholders' money and that acquired with the earnings produced by excessive rates.

The only answer that must be given to those who contend that the original cost may be too high is that in a very large proportion of the cases of valuations in this country, the original cost will be found smaller than the replacement cost. In other words, it would cost more to replace the property today than it cost to construct it originally. The excessive earnings of the past were invested in property useful to the public and not paid out as dividends to the stockholders. The present stockholders, in many cases, had bought their stock and invested their money in the property in good faith and with the knowledge that the undertaking had a property of a certain size and was in successful operation. It is not just to these investors that an undertaking with which they have entrusted their money, having property of greater value than the present value based on original cost, should have the value upon which rates can be based still further reduced because a portion of the property may have been purchased with money other than that contributed by the holders of securities. Common justice demands that, provided an undertaking is well managed and is giving good service but has capital assets in excess of the actual investment of the security holders in the enterprise, the present holders of securities should not be penalized. Capitalization on expected profits, high rates and large dividends, may have formed a financial policy in the past through no act of dishonesty on the part of the management, but simply through the application of those rules for the conduct of the business of private corporations which have been accepted commonly as proper before the distinction had been made between the conduct of private enterprises and that of those vested with public interest. In the case of public utility enterprises such methods of financial operation belong to the past and will never be possible in the future under competent legislative supervision. Justice to the undertaking demands that the past should be wiped out and a new start be made on a basis which is fair to those who have invested their money in the undertaking as well as to the public. In such cases as are now being considered, therefore, the original cost of the physical property less its loss in value due to depreciation should be accepted as a portion of the present value of the entire property based on original cost regardless of the sources of the money used in building the property.

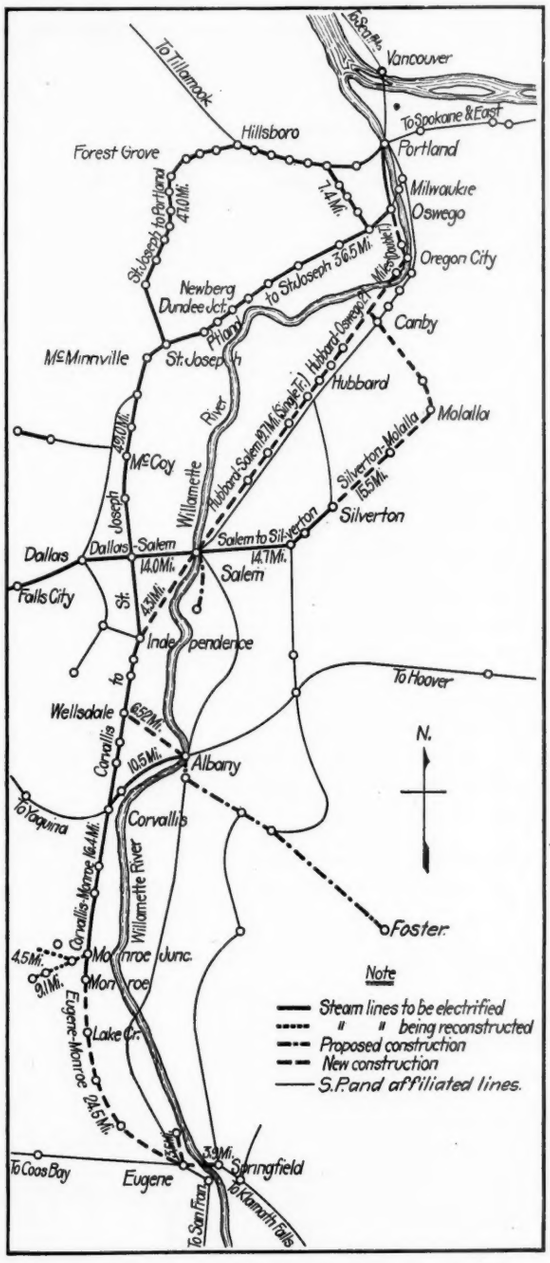
It must be admitted that there will be certain classes of utilities the original costs of which cannot be obtained with the ease which has been claimed in the foregoing pages. The principal exception will be steam railroads. The original costs of land used for roadway and for terminals can be obtained in but few instances. The same may be true of some portions of the property of the older gas and water companies. This would not be true of the property of most telephone or other electrical enterprises. The present accentuation of replacement cost may be due largely, if not entirely, to the fact that valuations of railroad properties were among the first made and that the precedents thus established have been followed in the valuations of other classes of utilities.

It is most important for the interests of public utilities that the original cost should be recognized, ascertained, and presented as an indication of value, in order that the replacement cost may be given its full significance, and not be reduced by the more or less arbitrary exclusion of certain items of value which clearly are the property of the undertaking. A corporation is entitled to a return, upon the present value of its property, which is not so low as to be confiscatory. The present value of the property, not necessarily the *fair* present value upon which rates should be based, is what that property would cost if reproduced at the present time less the loss in value which may have arisen from the time it has been in service. Clearly land is worth its full market price at the present time; likewise, construction in the streets is worth as much as it would cost a possible competitor to create a similar plant today. The same is true of similar items the value of which has increased with the development of the territory in which they are situated. The present value of the property of an undertaking is the full replacement cost, less depreciation, of all property in use or useful to the public at the present time, and upon that value the courts may be relied upon to hold that a return can be earned of an amount which is not so small as to be confiscatory.

Whether the replacement cost is the *fair* present value upon which a return is to be earned sufficient to requite the stockholders for their enterprise in developing the business and for the risk incurred in its promotion, must be left to the rate making tribunal to decide after all facts and figures have been presented for their information. The advocates of the theory of rates based on cost cannot attack the replacement cost. They can attack the acceptance of the replacement cost less depreciation as the sole fair basis of rates, and that is all. The original cost less depreciation, ascertained as has been described above, is also a figure important for the application of the cost theory, and should be equally before the rate making tribunal for its consideration. No arbitrary ruling as to which figures shall be given dominating importance can be laid down, as other facts and figures must be known to the tribunal.

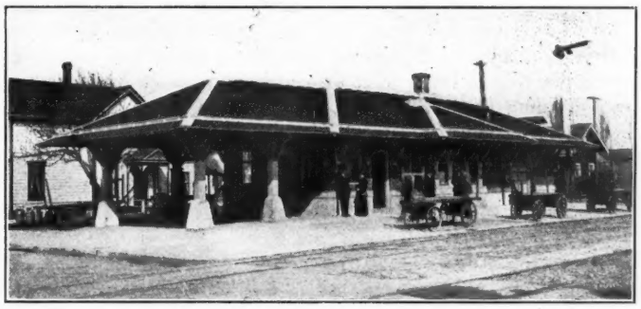
CONSTRUCTION OF THE PORTLAND, EUGENE & EASTERN.

The Portland, Eugene & Eastern was incorporated to electrify two branches of the Southern Pacific near Portland, Oregon, and two small steam roads which have been purchased, in addition to building a new electric interurban line from Portland to Salem, Corvallis and Eugene. When this construction work is finished the company will operate a network of electric roads which will cover practically the whole Willamette valley, and which it is expected will handle a large amount of freight from the ranches and orchards in the valley to the markets and shipping points in the larger cities, in addition to an important passenger traffic. The territory tributary to the line contains 190,000 people, exclusive of the city of Portland and the county in which it is located, the density of population being 19.5 per square mile. The Willamette valley contains the largest and most productive prune and cherry orchards in the northwest; one of the counties tributary to the new line raises almost half of the total crop of hops grown in the United States; and the products of truck gardens, dairy farms, agriculture and forests will also furnish some freight traffic. The decision to spend $12,000,000 in building an electric system was reached in 1910 following a complete examination by Robert E. Strahorn, who is at present the president of the company.



Map of Portland, Eugene & Eastern System.

The new main line from Portland to Eugene will be about 125 miles long and the total mileage, including all branches will be about 340 miles. The terminal in Portland will be on Fourth street near the center of the retail district, and in entering the city the line will cross most of the principal street car lines, which will make it easy for passengers to reach any portion of the city. The new main line south of Portland will use the existing Southern Pacific tracks to Oswego. From Oswego to Hubbard, 21 miles, a new double track line will be built, one track to be used by the interurban cars, and the other by the Southern Pacific main line steam trains. This location will reduce the distance on the Southern Pacific between Portland and Salem, and will also improve the line as to curvature and grade, reducing the maximum grade from 1.5 per cent. to 0.5 per cent. The character of the work on this section is shown by the quantities of material to be moved which are as follows: Rock excavation, 11,650 cu. yds. per mile; earth excavation, 43,450 cu. yds. per mile; embankment, 61,950 cu. yds. per mile; overhaul, 765,700 cu. yds. at an average distance of 12,350 ft.



New Station at McMinnville, Ore.

From Hubbard to Salem, 19.7 miles of new single track line will be built to a 0.5 per cent. maximum grade. At Salem the new line will cross the Willamette river on a new bridge recently completed at a cost of $300,000. This bridge also serves as an entrance to Salem for the Salem, Falls City & Western, a small steam road which has been purchased and which will be electrified as far as Dallas. A new cut-off has been built from Salem to Independence, 4.31 miles, which will form a link

Recently Completed Bridge Across the Willamette River at Salem, Ore.

in the new main line of the interurban system joining the old line of the Southern Pacific at Independence. Another cut-off is being built from Wellsdale on the old Southern Pacific line to Albany, allowing the new electric service to reach that point. From Albany to Monroe, the present line will be electrified, and from that point south to Eugene, 24.5 miles, a new single track line is being built to a maximum grade of 1.5 per cent., which involves only light grading, with the exception of one cut containing 29,000 cu. yds. of solid rock.

In addition to this main line, the system will include a branch from Canby through Molalla and Silverton to Salem. The Canby-Molalla section of this line, 11.35 miles long, is now under construction. It is being built to a maximum grade of 1 per cent., the grading being very light. The proposed line from Molalla to Silverton will be 15.5 miles long, will have a maximum grade of 2 per cent., and the grading will involve the following quantities: earth, 18,000 cu. yds. per mile; loose rock, 3,300 cu. yds. per mile; solid rock, 2,050 cu. yds. per mile, and overhaul, 242,600 cu. yds. The section from Silverton to Salem will use the present line of the Salem, Falls City & Western, which will be electrified. The present branches of the Southern Pacific west of Portland, known as the West Side and Yamhill branches, reach Forest Grove, St. Joseph, McMinnville and Independence. The completion of the main line and the electrification of these two branches will provide three distinct routes into Portland for Willamette valley shipments.

The franchise for entering Portland over Fourth street has been granted and material for the construction has been received. The electrification of the two branches forming the McMinnville loop is practically completed, these lines having been practically rebuilt. New depots have been erected at McMinnville and Forest Grove and at Newberg, McMinnville, Forest Grove and Hillsboro the line has been changed in order to locate the interurban terminals in the centers of the business sections. New rails have been laid on the old line from McMinnville to Monroe and the new line from Monroe to Eugene will be ready for operation within a short time. The Molalla line is graded from Canby to Molalla and track will be laid in a short time. Material is on the ground for the completion of the new main line from Oswego to Salem. The Portland, Eugene & Eastern has also acquired the street car systems at Salem, Albany and Eugene and is now building the system at Corvallis. It is now operating 15 miles of street railways at Salem and 17 miles at Eugene.

The electrified line from Portland to McMinnville by way of Forest Grove and back to Portland by way of Newberg, and the Beaverton cut-off from Beaverton to Cook will be served by three substations located at Oswego, Forest Grove and Dundee. Electric power will be received from the Portland Railway, Light & Power Co., at Milwaukie at 60,000 volts, 3-phase, 60 cycles, this power being generated at three plants located at Oregon City, Cazadero and Bull Run with outputs of 10.000, 25,000 and 20,000 h. p. respectively. This power will be transmitted over the company's transmission line to the Oswego substation, where two 1,000 k. w., 3-phase transformers will transform it from 60,000 volts to 13,200 volts. One transmission line will feed the Forest Grove substation from Oswego and another will transmit the power at 13,200 volts to the Dundee station. These transmission lines are of No. 1/0 7-strand hard drawn copper wire with a 3-ft. spacing and with all three wires arranged in the same plane on the crossarm. The Forest Grove and Dundee substations will be reinforced concrete fireproof buildings and will each contain two synchronous motor-generator sets of 500 k. w. capacity. These sets will supply energy to the trolley line at 1,500 to 1,575 volts D. C.

In addition to the motor-generator sets, each substation will contain the usual equipment of oil switches, switch boards and control apparatus. A small storage battery will be provided for furnishing control current for the operation of the oil switches and for emergency station lighting. Electrolytic lightning arresters will be provided both on the incoming transmission lines and on the outgoing 1,500 volt feeders. The Oswego substation, in addition to the transformers, will contain the same equipment of motor-generator sets as the two stations above described and will have provision for the installation of a third unit. Six other substations will serve the remainder of the line, to be located at Eugene, Lake Creek, Corvallis, Salem, McCoy and Hubbard. The distance between substations varies from 22 to 25 miles. These buildings will be somewhat similar to those already described. The cost of the Oswego station will be about $9,000 and that of the other eight will range from $4,200 to $5,500 each. The catenary type of construction is to be used for the trolley, a No. 4/0 grooved copper trolley being carried by a 7/16 in. galvanized steel messenger cable of 15,000 lbs. breaking strength. Cedar poles 9 in. in diameter at the top and with the butts treated are being used for this trolley line. Two telephone circuits will be provided, one to be used exclusively for telephone train despatching, and the other to connect substations and emergency line headquarters. A telephone selective system will be installed for despatching service, with selective calling apparatus in the principal stations and telephone sets at all sidings.

The cars will be of all-steel construction, approximately 56 ft. long with a seating capacity of 60 passengers. All cars will be arranged for multiple unit operation with automatic control, and will be operated in trains consisting of all motor cars or a combination of motor cars and trailers. Among the interesting features of the cars and equipment will be the roller pantograph trolley allowing the pantographs to be placed in contact with the trolley wire by the operation of a control switch in the cab of the leading car of the train. As the trolley potential is 1,500 volts and the lighting and control circuits on the cars are arranged for 600 volts, a dynamotor compressor is installed on each car to furnish 600 volt energy for these circuits. This machine receives the 1,500-volt trolley current and by means of a tap on the winding gives 600-volt current for the local circuits. This machine is also provided with a friction clutch and automatic devices which connect the compressor proper to the dynamotor when the air pressure in the brake system has dropped to a predetermined value such that it is necessary to operate the compressor. The dynamotor, acting as a motor, drives the air compressor to recharge the storage tanks. The cars will be equipped with four motors, each wound for 750 volts, but insulated for 1,500 volts. The motors will be connected two in series when operating on the 1,500-volt circuit, and by means of a commutating switch, the connections can be so changed that each motor will be thrown directly across the trolley circuit when the car is operating on the 600-volt city lines. For freight service a number of 1,500-volt, 60-ton electric locomotives equipped in somewhat the same manner as the passenger cars will be provided.

Plans have been made for general car shops near Portland, the buildings for which will be of reinforced concrete construction and will include all modern machine shop facilities. The main shop building will contain a floor area of 40,200 sq. ft. and will cost approximately $100,000. The yard layout around these shop buildings will include about three miles of track. Other small buildings in connection with the shops include a 20 ft. by 40 ft. blacksmith shop; 16 ft. by 32 ft. inspection office and a 40 ft. by 80 ft. boiler house.

Proposed Line for Argentina.—The public works committee of Argentina has under consideration the request of the Central Argentine for a concession for a branch line from Santa Rosa to Luxardo and Obispo Trejo, province of Cordoba. The committee has reported favorably on the petition of the same railway for building a line from Luxardo northwesterly for 15 miles, then on to Obispo Trejo, passing through Santa Rosa; also a branch from Santa Rosa to Sacanta.

LOCOMOTIVE TRACTIVE EFFORT.

The Development of a Formula Which Includes Allowances for the Limits to the Physical Strength of the Fireman.

By H. A. Houston,
Rock Island Lines, Chicago, Ill.

The variation of draw-bar pull or tractive effort of steam locomotives depends on two things: first, the cylinder capacity, and second, the boiler capacity. The characteristics of the cylinder and boiler, and their dimensional relation to each other, are generally determined by the character of the service for which the locomotive is desired.

MAXIMUM TRACTIVE EFFORT AT LOW SPEEDS.

It is a common practice in the design of steam locomotives to proportion the working parts so that at starting they just fail to slip the drivers on a good rail, thereby making the adhesion the absolute limit of tractive effort. In such cases, the tractive effort is determined by the size of the cylinder, the steam pressure in the cylinder, etc., and not by the weight on the drivers and the coefficient of static friction between the wheels and rail. This coefficient of static friction may be, with an excellent condition of the wheel and rail, as high as 30 per cent.; with good conditions and with the aid of sand, 25 per cent.; with good conditions without sand, 22 per cent.; while on a slippery or icy rail it may fall to 8 or 10 per cent. If this value of the coefficient of static friction is n, and the value of the driver weight upon the rail in pounds is W_d, then the limit of the tractive force is nW_d.

By the term maximum tractive effort at low speeds is meant that force at the engine draw-bar that a locomotive is capable of exerting while at the same time sustaining full boiler pressure. Maximum tractive effort can only result under the combined conditions of full boiler pressure, long cut-off, wide open throttle, and low speeds. The low speeds generally have an upper limit ranging from 5 to 10 m. p. h.. This upper speed limit is dependent upon the ratio of boiler capacity to cylinder capacity, that is, the maximum tractive effort is applicable to a speed where the cylinders have a demand less than, or equal to, the boiler capacity. For relatively small cylinders, the speed may reach 9 or 10 m. p. h., for relatively large cylinders the speed may reach only 4 or 5 m. p. h.

The maximum tractive effort for two cylinder simple locomotives, neglecting the engine friction, is:

$$\text{T. E.} = \frac{(\text{m. e. p.})\ d^2\ S}{D} \qquad (1)$$

Where T. E. = Tractive effort.
m. e. p. = Mean effective pressure.
d = Diameter of the cylinder.
D = Diameter of the driver.
S = Stroke.

For general purposes the mean effective pressure is considered 92.5 per cent. of the boiler pressure (P) and the engine efficiency about 92 per cent. Making these additions equation (1) becomes

$$\text{T. E.} = \frac{0.85\ P\ d^2\ S}{D} \qquad (2)$$

Formula *2* is used to determine tractive effort at low speeds unless it gives results that are greater than one-fourth the weight on drivers, in which case the latter value of $\frac{1}{4}\ W_d$ is used.

MAXIMUM TRACTIVE EFFORT AT HIGH SPEEDS.

In the preceding discussion of tractive effort at low speeds, there is assumed to be ample boiler capacity for supplying steam, but as the speed increases, the cylinders demand more steam per unit of time until the cut-off must be shortened in order to maintain boiler pressure. Evidently the capacity of the boiler has been reached and is the limiting feature in tractive effort at high speeds.

Methods for the determination of maximum tractive effort for simple locomotives at high speeds have been proposed by many experimenters, chief among whom is Dr. W. F. M. Goss, who proposed the following formula:

$$\text{T. E.} = \frac{161\ H}{V} \qquad (3)$$

Where T. E. = Tractive effort in pounds on level track.
H = Heating surface in square feet.
V = Velocity in miles per hour.

In equation *3* it is assumed that any locomotive boiler can develop an actual evaporation rate of 12 lbs. of water for each square foot of heating surface per hour, and that 28 lbs. of steam are required per I. H. P. Hr.

In the formation of equation *3* there are three points to which the writer wishes to call attention and, in a way, to make corrections for them in the development of a new equation for tractive effort at high speeds. These points are:

First: The assumption that a fireman always possesses the strength and ability to fire any locomotive boiler at the rate of 12 lbs. actual evaporation per square foot of heating surface per hour.

Second: The assumption that the thermal value of the coal fired is always the same.

Third: The assumption that at all speeds the steam consumption per I. H. P. H. is constant.

In other words, it is the intention of the writer to develop a formula for tractive effort at high speeds, and instead of basing such a formula on the heating surface only, it will be based on the performance of the fireman, the heating surface, the rate of evaporation, and the steam consumption per I. H. P. H. as variables. Points 2 and 3 above were discussed in the *Railway Age Gazette* for March 22, 1912, page 685, and the results given were based on long periods of sustained operation,

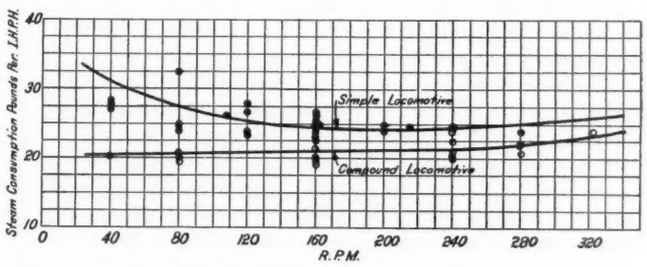


Fig. 1—Steam Consumption per I. H. P. H.

which seem unreasonable for typical American practice where the average profile of the railroads is rolling, requiring sustained operation for short periods only. For this reason the steam combustion curves shown in Fig. 1 were drawn, the data being taken from the results of tests made at the St. Louis Exposition, at the Altoona testing plant of the Pennsylvania and at Purdue University.

Owing to the fact that the tests at low speeds are made with considerably less than maximum power, the steam consumption curve for simple locomotives has not been drawn through the plotted points, as an attempt has been made to have it representative of maximum working conditions. The water rate for

simple locomotives as shown in Fig. 1 may be represented by an empirical equation,

$$S = 34.0 - 0.1\ R + 0.001\ \frac{R^2}{4}$$

Where S = Pounds of steam consumed per I. H. P. H.
R = Revolutions per minute.

For compound locomotives there is not the variation in the water rate that there is in the case of simple locomotives, as is shown by the curve, and it would seem that a constant water rate of 21 lbs. could be used as representing the average value, without introducing any material error.

From an analysis of the results of the above mentioned locomotive tests the curve shown in Fig. 2 was drawn showing the fair value of a maximum rate of equivalent evaporation per sq. ft. of heating surface for any locomotive that may be expected from coals of different heat values. These rates of maximum

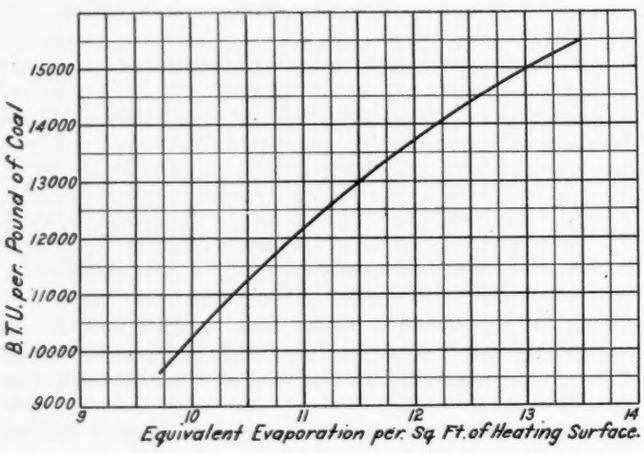


Fig. 2—Maximum Rate of Equivalent Evaporation for Various Coal Heat Values.

evaporation may be expected from any locomotive boiler working to a maximum, under ordinary conditions of the road, with a normal ratio of heating surface to grate surface, and economical firing. It is here assumed that the required rate of firing the fuel is within the limits of the fireman's strength. From these results an average ideal locomotive has been assumed. This engine has a maximum rate of equivalent evaporation of 12.89 lbs. per sq. ft. of heating surface per hour, for 2,700 sq. ft. of heating surface, with ratio of heating surface to grate surface equal to 61, thereby requiring 4,730 lbs. of coal having a thermal value of 14,850 B. t. u. to be fired per hour.

The power developed by a boiler is proportional to the rate of evaporation, the rate of evaporation is dependent on the proportions of the boiler and the amount of fuel which the fireman can handle economically. If a coal of high thermal value is used to increase the evaporative efficiency of the boiler, thereby making it possible to evaporate more water for each pound of fuel consumed, then the boiler may be forced to its maximum power. Of course, if this causes a firing rate too high for the fireman, and it is desirable to retain this maximum evaporative efficiency, then it becomes necessary to resort to some method of mechanical stoking.

With the modern locomotive where the heating surface is very large, and with a normal ratio of heating surface to grate surface, it is impossible for the average fireman to hand-fire such a locomotive up to the maximum rate of evaporation; especially is this so if the fuel is not of high thermal value. In such a case the limit on the output of power is found not in the proportions of the locomotive, but in the strength and ability of the fireman.

FORMULA FOR MAXIMUM TRACTIVE EFFORT.

It is evident that the work developed in the cylinders of a locomotive is equal to the work available at the draw-bar, provided that there are no frictional losses between these points. Then this may be represented thus:

WORK (in the cylinders) = WORK (at the draw-bar)

or I. H. P. × 33,000 × 60 = D. B. P. × distance traversed in feet per hour

= D. B. P. × 5,280 × velocity (V) in miles per hour

$$\text{or D. P. B.} = \text{T. E.} = \frac{\text{I. H. P.} \times 33{,}000 \times 60}{V \times 5{,}280} = \frac{375 \times \text{I. H. P.}}{V} \quad ..(4)$$

Now, if

E = Maximum rate of equivalent evaporation per square foot of heating surface per hour,

e = Maximum rate of actual evaporation per square foot of heating surface per hour,

S = Actual steam consumption per I. H. P. H., pounds,

H = Number of square feet of heating surface (fire side). (For superheater engines let 1 sq. ft. of superheating surface be equivalent to 1½ sq. ft. of water heating surface.)

$$\text{Then} \quad \text{H. P.} = \frac{e \times H}{S}$$

Since the evaporation rate is generally given in terms of equivalent evaporation from and at 212 deg. F. it seems advisable to put e in terms of E. This may be done in the following manner, if we assume a boiler gage pressure of 200 lbs. per sq. in. and a feed water temperature of 60 deg.F. Let F equal the factor of evaporation, then

$$e = E \times \frac{1}{F}$$

Now, $F = 1.2069$ for a feed water temperature of 60 deg. F., and 215 lbs. absolute pressure. Therefore, for average conditions

$$e = \frac{E}{F} = \frac{E}{1.2069}$$

By substitution

$$\text{H. P.} = \frac{E \times H}{1.2069\ S} \quad .....(5)$$

Substituting the value for horse power in equation 5 in equation 4, we have

$$\text{T. E.} = \frac{310.7 \times E \times H}{V \times S} \quad .....(6)$$

Formula 6, which is a general formula for steam locomotive tractive effort, will serve as a basis for all calculations pertaining to locomotive tractive effort as treated in this article.

On the same basis on which Fig. 2 is estimated, the following table is presented, showing different areas of heating surface which, under maximum rates of evaporation when fuel of any thermal value is used, require the accompanying pounds of coal fired economically:

TABLE VI.

When heating surface is equal to:	Pounds of coal that must be fired per hour.
2,700 sq. ft.	4,730
3,000 sq. ft.	5,260
3,500 sq. ft.	6,120
4,000 sq. ft.	7,000
4,500 sq. ft.	7,880
5,000 sq. ft.	8,760
5,500 sq. ft.	9,640
6,000 sq. ft.	10,520

When B. t. u. value of coal = 14,850 and rate of equivalent evaporation = 12.89 lbs., or, when any other pair of values given in Fig. 2 are used.

For example, suppose a locomotive has 3,500 sq. ft. of heating surface, 80 in. driving wheels, and is to be fired with a coal having a thermal value of 13,000 B. t. u. per pound. To find its tractive effort at high speeds; first, by Fig. 2 it is found that a fair value for the maximum rate of equivalent evaporation per square foot of heating surface per hour is 11.5 lbs. And in Table VI it is found that 6,120 lbs. of coal must be fired per hour. If the fireman can fire at this rate, then it is simply a question of substituting in equation 6 the following values:

E = 11.5
H = 3,500

$$S = 34.0 - 0.1\ R + 0.001\ \frac{R^2}{4}$$

If a coal of different thermal value is used, then the value of E will change correspondingly.

Now, if we again take the above example, and limit it to the fireman's performance by saying that a certain fireman can only fire 5,000 lbs. of coal per hour, then 6,120—5,000 or 1,120 lbs.

of coal are not fired in each hour. In such a case, we cannot expect 11.5 lbs. as a maximum value of E. But, if we take $\frac{5,000}{6,120}$ of 13,000, we obtain the thermal value of an equivalent coal, which gives the same rate of evaporation corresponding to the thermal value given in Fig. 2 as that portion of the original coal which is actually fired. This correction is necessarily due to the incapacity of the fireman to handle the entire weight of coal given in Table VI. Now, $\frac{5,000}{6,120} \times 13,000 = 10,620$, which is the thermal value of this equivalent coal. Then from Fig. 2 the maximum rate of equivalent evaporation is 10.18 lbs.

To find the tractive effort of this locomotive when limited by the performance of the fireman, it is only necessary to substitute in equation *6* the following values:

$$E = 10.18$$
$$H = 3,500$$
$$S = 34.0 - 0.1\ R + 0.001\ \frac{R^2}{4}$$

Dr. W. F. M. Goss, in his "Locomotive Performance," arrives at similar conclusions when he expresses cylinder horse power in terms of heating surface. The results of his tests at Purdue University justified him in using 28 lbs. of steam per I. H. P. H., and an actual evaporation rate of 12 lbs. of steam per square foot of heating surface per hour. Then as many horse power are delivered per square foot of heating surface as are expressed by the ratio of 12 to 28, or 0.43, that is:

$$\text{I. H. P.} = \frac{12}{28} \times \text{H. S.} = .43\ H$$

and as previously shown,

$$\text{T. E.} = 375\ \frac{\text{I. H. P.}}{V}$$

By substitution,

$$\text{T. E.} = \frac{375 \times 0.43\ H}{V} = \frac{161 \times H}{V} \quad \ldots\ldots\ldots\ldots (7)$$

This formula gives values which are about 11.2 per cent. higher than those which are obtained by the use of formula *6*. The proof of this statement is based on the assumption that 25 lbs. per I. H. P. H. steam consumption is sufficiently accurate to be taken as constant (see Fig. 1), and that the steam which is generated is subject to the requirements of the cylinders only, as the air pump and safety valve generally do not operate to any great extent when the cylinders are working. The water rate for the average locomotive using saturated steam is from 22 to 30 lbs. per I. H. P. H., and for superheater locomotives this amount may be safely reduced 18 per cent.

In the tests made at Purdue University and published in "Locomotive Performance" by Dr. Goss, a coal was used which had an average thermal value of 13,000 B. t. u. per pound. Therefore, a reduction of formula *6* to the terms found in formula *7* for purposes of comparison necessitates the following substitutions, viz.:

Thermal value of dry coal = 13,000 B. t. u.
Steam consumption = 25 lbs. per I. H. P. H.
Rate of equivalent evaporation = 11.5 lbs.
(On the assumption that the performance of the fireman is unlimited.)

By substitution in formula *6*, we have

$$\text{T. E.} = \frac{310.7 \times 11.5 \times H}{25 \times V} = \frac{143\ H}{V} \quad \ldots\ldots\ldots\ldots (8)$$

The ratio of 161 in equation *7* to 143 in equation *8* gives the proportional increase in values to be expected, which is 11.2 per cent., when equation *7* is used to determine the variation of locomotive tractive effort with velocity. When other coals whose thermal values are lower than 13,000 B. t. u. are burned in the locomotive firebox, the difference in values of tractive effort, when solved by equation *7*, will continue to increase in proportion to the changes in the rates of equivalent evaporation. If coals of better thermal values than 13,000 B. t. u. per pound are fired, then the difference in values of tractive effort, when solved by equation *6*, and then by equation *7*, will continue to decrease, and the resulting values from either formula will become equal to one another when a coal of 14,950 B. t. u. per pound thermal value is fired.

Therefore, it seems that the use of formula *6*, which has a valid derivation and gives more reasonable and more accurate results of locomotive tractive effort at the cylinders than other formulae where the size and speed of the driving wheels, the thermal value of the coal, and the performance of the fireman are neglected, is justified.

INTERPRETATION OF THE RULES OF INTERCHANGE.

At the recent convention in Minneapolis of the Chief Interchange Car Inspectors' and Car Foremen's Association, the code of rules for interchange as adopted by the Master Car Builders' Association was discussed with a view of determining the correct interpretation of each rule, where there seemed to be any chance of misunderstanding. The following are the important conclusions reached under the various rules:

Rule 1. This rule was generally understood to mean that each road should conscientiously give all foreign cars the same care as to inspection, oiling, packing, adjusting brakes and running repairs that it gives to its own cars.

Rule 2. In regard to the first paragraph, many roads rely on the inspection of the receiving roads to determine defects, while others make their own inspection before delivering. Both practices have given satisfactory results.

In regard to paragraph *c*, many roads accept the improperly loaded car and transfer the load at the expense of the delivering line rather than turn the car back to the delivering line, thereby getting a more prompt delivery of the freight.

Rule 3. The second paragraph of this rule was believed by many to offer protection to the negligent car inspector, and it was thought that better results could be obtained by having this paragraph eliminated from the rules.

Rule 16. Under this rule it was believed to be permissible to make as heavy repairs as are required to place the car in good condition up to the extent of combination defects and to charge the delivering line or the owner as the case requires.

Rule 32. Under this rule the question of missing brake staffs on cars where they were removed for the accommodation of the lading was considered to be a delivering line defect, for when such cars are received, the inspectors should ascertain whether or not the brake staffs were with the car.

Rule 35. The stenciling of cars as mentioned in the third paragraph was taken to mean the date when the cars were rebuilt rather than when they were originally constructed.

Rule 39. The word "substitute" for draft timber was taken to mean any of the metal draft gears.

Rule 42. It was the consensus of opinion that two broken end posts and two corner posts are cardable defects.

Rule 43. Burned flooring or siding not able to be seen from the outside of the car and under the ordinary methods of inspection was considered as a "concealed fire damage."

Rule 60. In case of neglect to stencil the date of cleaning the various air brake parts, if those parts are recleaned on account of the date shown by the old stencil, the road performing the first cleaning cannot collect for the work done. In case it is necessary to clean those parts soon after they have been cleaned by another road, a joint inspection should be made to determine whether the road that did the first cleaning or the owner should pay for the second cleaning.

Rule 68. It is understood that both wheels mentioned in the first paragraph shall be charged to the delivering company, even if the mating wheel has no slid flat spot.

Rule 105. A manufactured article was considered as one that

was not included in the schedule and that would have to be purchased in the open market.

Rule 120. While this association appreciated that the rewording of this rule is in accordance with their suggestion, they believed it could be made stronger and serve better the purposes for which it is intended, by insisting in some way that requests for home route cars be given more prompt attention. A motion was passed requesting the Master Car Builders' Association to impress on the proper railway officers, "the importance of all roads throughout the country giving their immediate attention to requests for home route cards or for authority for dismantling cars, as it is found that such home route cards or authority for dismantling is being unduly delayed. This, taken in conjunction with lack of proper storage room, is working seriously to the disadvantage of handling lines. Attention is also called to the fact that, in some cases, when cars reach the owner's line they are not repaired permanently, and it is respectfully recommended that owners give proper attention to such cars rather than permit them to again leave the home line with the same defects in existence."

It was understood that the per diem rates stop from the date of asking for home route cards. It was also understood that the car owner is obliged to pay for putting the car in sufficient repair for home routing.

It was also mentioned that car service *Rule 3,* paragraph F, was soon to be changed to coincide with the new rule.

The following addition to this rule was recommended to the Master Car Builders' Association: "If a car is found to have decayed or worn out parts which constitute an unfair usage combination under rules 37 to 42 inclusive, and if repairs are made without authority from the car owners, a joint evidence statement shall be furnished stating the actual condition of the car in accordance with rule 12, and this statement will be the authority for the company having such car in its possession to make all necessary repairs and to bill the car owner for the cost of repairs, provided these repairs are necessary on account of defects due to ordinary wear and tear. The joint statement is to accompany the repair card, as authority for the bill." This change is suggested in order to facilitate prompt repairing of bad order cars and place the responsibility for these repairs where it properly belongs. Under the present rules and decisions the company having such a car in its possession must write the car owner for authority to repair before any repairs are made. This action results in seriously delaying bad order cars and also burdens the company handling the car with per diem charges which frequently amount to more than the cost of repairing the car.

Rule 14. In order to have uniform methods for locating defects, it was agreed to observe the following system for underframe and superstructure. On behalf of a car, the sides shall be designated right and left from a position facing the car at A end and the sides on the B half of the car shall be likewise designated from a position facing the car at B end.

Car service *Rule 15.* A great deal of trouble has been experienced by improper loading of open cars. An inspection at Chicago disclosed the fact that less than ten per cent. of such cars were loaded in accordance with the rule. It was believed that the shippers should be more carefully informed and be made to live up to the rules. The Chicago Car Interchange Bureau has a printed form requesting authority for reloading such cars which is sent to either the shippers or the delivering road, as the case may be. In some localities it is easier to force the shipper to conform to the rules, and it would be possible in all localities, if all the roads would enforce this rule as they should. It was also stated that box cars should be as carefully watched, as overloading often forces the car doors outside the clearance limits. At Buffalo an average of twelve hundred cars are reloaded per month..

It was stated that much more care should be exercised in placing proper car initials and numbers on repair cards. The yard inspectors are found to give the most trouble. When checked with work cards, corrections can often be made before much trouble has been caused.

One hundred and sixty-two members were registered and the sessions were well attended. The following officers were elected for the ensuing year: F. C. Shultz, chief interchange inspector, Chicago, president; F. H. Hanson, assistant master car builder, Lake Shore & Michigan Southern, vice-president; S. Skidmore, foreman, car department, Big Four, secretary-treasurer.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE.

The tables on the immediately following pages show the number of freight cars in service on all of the important railroads of the country in 1911 and 1912, and in 1900 and 1912. The figures are compiled by a railway officer to whom we are indebted for the opportunity of publishing them. It will be noted that narrow-gage cars are excluded, as well as non-revenue cars, but that cars used to carry company freight are included. The railways are grouped under the heads of New England roads, trunk line roads, Southern classification roads, Central classification roads and Western classification roads.

The tables show the number of cars in service, the number of cars per mile of road, average length of haul, freight cars per thousand freight car miles and per thousand ton miles, the average rate per ton per mile, and the freight cars in service per thousand dollars of freight earnings.

Argentine Railway Development.—The public works committee of the senate of the state of Buenos Aires has approved a bill providing for the construction by the state of a railway system connecting La Plata, Bahia Blanca, Buenos Aires, Sierra Chica, Olavarria, and Mar del Plata and authorizing the issue of $16,405,000 4½ per cent. bonds for the construction of the lines.

New Lines for China.—The Société Belge de Chemins de Fer en Chine has signed with the Chinese government another important railway contract. It includes a loan of $50,000,000 to be issued at 5 per cent. for constructing a line beginning near the eastern border of inner Mongolia in the latitude of Peking and running thence south southwestward across the Empire for over 1,000 miles to Cheng-tu in Szechwan. Another contract for almost as important a railway from Lauchow on the southern border of Mongolia, southeast to Kweichow on the Yangtze, was recently given to the same company.

Railway Construction in Africa.—The Elizabethville-Kambove section of the Cape-to-Cairo Railway will be in operation, it is stated, this month, upon the completion of two bridges. From Kambove the line will then be extended toward Bukama, the preliminary work on this section now being under way. It is expected that 60 miles of this division will be constructed by March, 1914. The greatest difficulty is the lack of native labor. The Lower Congo-Katanga Railway, which will connect Lower Congo with Katanga, is now being surveyed, and work will be commenced upon the completion of the survey. This line, as originally planned, will cut off from the Matadi-Leopoldville line at N'Dolo at Stanley Pool, thence crossing the Kwango river toward the fourth parallel and the Kasai river toward Djoko Punda below Wissmann falls. It is planned to join the Cape-to-Cairo line at Bukama. The total length of the line is about 1,100 miles, and it is hoped it will be opened to traffic by 1920. Owing to the enormous cost of the line as a whole, the only section to be built at present is the Djoko Punda-Bukama division, inasmuch as Djoko Punda is reached by steamer from Stanley Pool. The Congo-Tanganyika Railway from Kabalo on the Congo river to the exit of the Lukuga river from Lake Tanganyika is considerably more than half completed. Rails have been laid for 97 miles, of which 36 miles were completed since January 1. There remain 67 miles to be built before the lake is reached, but a portion of the grading on this has been finished.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILROADS OF THE UNITED STATES—1911 AND 1912.

Note.—Narrow gage cars excluded. Non-revenue cars excluded. Company freight included.

	Miles.		Frt. equipment.				Per cent. of change.	Frt. cars per mile of road.		Average length of haul.		Freight Cars—Per 1,000 frt. car miles.		Freight Cars—Per 1,000 rev. ton miles.		Rate per ton mile. (Dollars.)		Freight cars per $1,000 frt. earnings.	
	1911.	1912.	1911.	1912.	Increase.	Decrease.		1911.	1912.	1911.	1912.	1911.	1912.	1911.	1912.	1911.	1912.	1911.	1912.
NEW ENGLAND ROADS:																			
Boston & Maine	2,290	2,291	25,880	25,410	.....	470	1.82	11.3	11.1	102.54	103.86	.119	.115	.0109	.0103	.01095	.01089	1.00	0.95
Bangor & Aroostook	622	625	5,350	5,335	.....	15	0.28	8.6	8.6	122.79	125.51	.291	.272	.0261	.0237	.01158	.01121	2.26	2.11
Central Vermont	536	536	2,310	3,451	1,141	.....	49.39	4.3	6.4	76.12	76.73	.077	.110	.0077	.0111	.00940	.00930	0.82	1.20
Maine Central	932	1,192	8,446	9,110	664	.....	7.86	9.1	7.6	84.74	90.16	.177	.163	.0157	.0149	.01034	.01088	1.53	1.37
New York, New Haven & Hartford.	2,042	2,092	38,441	38,053	.....	388	1.01	18.8	18.2	93.80	94.95	.182	.178	.0176	.0162	.01390	.01371	1.27	1.18
Total	6,422	6,736	80,427	81,359	932	.....	1.16	12.5	12.1	95.99	98.24	.169	.168	.0121	.0152	.01123	.01120	1.40	1.36
TRUNK LINE ROADS:																			
Baltimore & Ohio	4,434	4,455	88,342	87,002	.....	1,340	1.52	19.9	19.5	193.29	193.04	.110	.106	.0075	.0070	.00578	.00580	1.31	1.20
Buffalo, Rochester & Pittsburgh	573	570	15,636	16,625	989	.....	6.32	27.3	29.2	154.70	159.30	.190	.191	.0098	.0098	.00487	.00480	2.02	2.03
Central of New Jersey	634	669	21,859	22,015	156	.....	0.71	34.5	32.9	71.80	70.87	.165	.168	.0099	.0100	.00849	.00861	1.17	1.16
Chesapeake & Ohio	2,229	2,263	41,790	43,740	1,950	.....	4.67	18.7	19.3	247.00	256.00	.125	.125	.0069	.0065	.01040	.01043	1.63	1.60
Delaware & Hudson	878	878	20,046	19,712	.....	334	1.67	22.8	22.4	129.35	144.11	.127	.121	.0072	.0066	.00680	.00620	1.13	1.05
Delaware, Lackawanna & Western	985	985	28,720	28,720	.....	.....	....	29.2	29.2	170.82	170.50	.108	.112	.0081	.0076	.00752	.00731	1.08	1.05
Erie	2,267	2,258	47,239	49,465	2,226	.....	4.71	20.8	21.9	181.67	184.61	.101	.104	.0069	.0072	.00585	.00583	1.18	1.24
Lehigh Valley	1,430	1,441	43,582	43,352	.....	230	0.53	30.5	30.1	160.79	160.42	.138	.142	.0086	.0087	.00652	.00646	1.37	1.40
New York Central & Hudson River	3,790	3,791	68,167	71,693	3,526	.....	5.17	18.0	18.9	196.00	194.62	.080	.084	.0062	.0061	.00633	.00626	1.11	1.10
New York, Ontario & Western	566	566	7,267	6,409	.....	858	11.80	12.8	11.3	146.63	145.29	.112	.110	.0075	.0074	.00754	.00758	0.99	0.98
Pennsylvania Railroad	4,085	4,092	139,079	139,346	267	.....	0.19	34.0	34.1	155.14	153.42	.122	.123	.0067	.0060	.00587	.00583	1.21	1.08
Reading	1,022	1,015	41,912	40,210	.....	1,702	4.06	41.1	39.6	97.57	93.82	.141	.135	.0085	.0079	.00722	.00704	1.18	1.13
Western Maryland	543	543	6,780	6,635	.....	145	2.14	12.5	12.2	100.37	94.55	.120	.116	.0071	.0066	.00625	.00596	1.14	1.11
Total	23,436	23,526	570,419	574,924	4,505	.....	0.79	24.3	24.4	154.24	155.43	.126	.125	.0078	.0075	.00688	.00677	1.27	1.24
SOUTHERN CLASSIFICATION:																			
Atlantic Coast Line	4,499	4,568	25,205	27,233	2,028	.....	8.05	5.6	5.9	151.98	153.60	.123	.131	.0142	.0148	.01215	.01230	1.17	1.21
Central of Georgia	1,915	1,915	10,084	10,302	218	.....	2.16	5.3	5.4	146.79	147.70	.138	.135	.0107	.0101	.01096	.01120	1.21	1.16
Florida East Coast	583	642	1,104	1,267	163	.....	14.71	1.9	2.0	153.64	162.89	.056	.057	.0091	.0107	.01777	.01772	0.51	0.60
Louisville & Nashville	4,621	4,740	44,564	44,727	163	.....	0.36	9.6	9.4	172.01	170.00	.117	.116	.0087	.0086	.00767	.00786	1.14	1.10
Mobile & Ohio	1,114	1,114	10,483	10,305	.....	178	1.70	9.4	9.2	221.05	223,70	.095	.097	.0071	.0070	.00612	.00679	1.28	1.13
Nashville, Chattanooga & St. Louis	1,230	1,230	9,950	9,943	.....	7	0.07	8.1	8.1	147.00	146.00	.380	.408	.0116	.0121	.01010	.01030	1.14	1.18
Norfolk & Western	2,004	2,018	41,157	42,065	908	.....	2.21	20.5	20.8	263.18	273.74	.063	.096	.0036	.0052	.00443	.00424	0.80	1.22
Norfolk Southern	608	608	2,587	3,019	432	.....	16.70	4.3	5.0	77.83	80.81	.234	.249	.0210	.0226	.01620	.01643	1.30	1.38
Seaboard Air Line	3,037	3,059	14,733	15,846	1,113	.....	7.55	4.8	5.2	142.02	147.87	.109	.115	.0116	.0100	.01160	.01110	1.00	1.03
Southern Railway	7,042	7,088	50,978	50,919	.....	59	0.12	7.2	7.2	156.70	154.58	.129	.127	.0100	.0098	.00966	.00987	1.29	1.23
Total	26,653	26,982	210,845	215,626	4,781	.....	2.27	7.9	8.0	163.21	166.09	.144	.153	.0108	.0111	.01066	.01078	1.08	1.12
CENTRAL CLASSIFICATION:																			
Chicago, Indianapolis & Louisville	617	617	6,003	6,769	766	.....	12.76	9.7	11.0	132.67	133.60	.169	.178	.0110	.0117	.00836	.00826	1.48	1.59
Cincinnati, Hamilton & Dayton	1,015	1,015	12,215	11,281	.....	934	7.65	12.0	11.1	127.63	122.63	.156	.144	.0091	.0082	.00528	.00535	1.77	1.57
C. C. C. & St. Louis	2,012	2,012	23,870	24,490	620	.....	2.60	11.9	12.1	149.00	152.30	.085	.087	.0062	.0057	.00550	.00543	1.20	1.10
Grand Rapids & Indiana	586	578	3,230	3,207	.....	23	0.71	5.5	5.6	100.10	96.73	.094	.099	.0075	.0063	.00689	.00707	1.09	0.98
Lake Erie & Western	886	906	3,514	3,150	.....	364	1.02	4.0	3.5	127.26	123.98	.070	.061	.0051	.0042	.00636	.00656	0.83	0.68
Lake Shore & Michigan Southern	1,775	1,872	50,281	54,861	4,580	.....	9.11	28.3	29.3	158.30	159.50	.120	.123	.0082	.0076	.00532	.00529	1.61	1.51
Michigan Central	1,817	1,817	25,202	26,227	1,025	.....	4.07	13.9	14.4	150.00	145.00	.092	.099	.0079	.0078	.00642	.00664	1.29	1.23
New York, Chicago & St. Louis	523	523	12,950	12,622	.....	328	2.53	24.8	24.1	197.00	196.00	.085	.082	.0071	.0060	.00515	.00502	1.41	1.23
Pennsylvania Company	1,416	1,751	56,677	59,328	2,651	.....	4.68	40.0	33.9	79.25	79.85	.154	.137	.0084	.0068	.00585	.00572	1.52	1.25
P. C. C. & St. Louis	1,467	1,472	24,508	27,596	3,088	.....	12.60	16.7	18.7	118.19	125.82	.080	.079	.0054	.0048	.00614	.00580	0.94	0.89
Pere Marquette	2,331	2,330	18,241	17,943	.....	298	1.63	7.8	7.7	179.62	167.86	.123	.132	.0092	.0094	.00579	.00643	1.69	1.59
Vandalia	827	827	8,835	8,832	.....	3	0.03	10.7	10.7	104.80	107.40	.122	.118	.0088	.0076	.00661	.00648	1.38	1.22
Total	15,272	15,720	245,526	256,306	10,780	.....	4.39	16.1	16.3	135.32	134.22	.112	.112	.0078	.0072	.00614	.00617	1.35	1.24
WESTERN CLASSIFICATION:																			
Atchison, Topeka & Santa Fe	10,400	10,733	59,763	62,241	2,478	.....	4.14	5.7	5.8	347.45	329.59	.088	.092	.0066	.0070	.01028	.01026	0.83	0.87
Chicago & Alton	1,025	1,026	11,832	11,756	.....	76	0.64	11.5	11.5	151.42	152.72	.104	.100	.0072	.0068	.00606	.00576	1.28	1.26
Chicago & Eastern Illinois	966	1,275	18,861	25,516	6,655	.....	35.28	19.5	20.0	150.03	146.21	.173	.209	.0093	.0115	.00480	.00530	2.00	2.29
Chicago & Northwestern	7,743	7,960	60,971	59,098	.....	1,873	1.43	7.9	7.4	147.92	138.11	.176	.194	.0112	.0115	.00900	.00910	1.24	1.27
Chicago, Burlington & Quincy	9,075	9,074	51,050	55,726	4,676	.....	9.16	5.6	6.1	251.20	254.92	.086	.092	.0071	.0073	.00816	.00752	0.87	0.97
Chicago Great Western	1,492	1,496	11,407	11,294	.....	113	0.99	7.6	7.5	228.62	222.66	.111	.115	.0080	.0084	.00718	.00725	1.29	1.27
Chicago, Milwaukee & St. Paul	7,296	7,296	42,642	45,778	3,136	.....	7.35	5.8	6.3	198.68	192.12	.086	.096	.0069	.0077	.00841	.00839	0.95	1.07
Chicago, Milwaukee & Puget Sound	1,917	2,059	11,513	11,959	446	.....	3.87	6.0	5.8	532.14	542.51	.121	.109	.0078	.0074	.00958	.00883	0.92	0.92
Chicago, Rock Island & Pacific	8,026	8,036	42,437	41,798	.....	639	1.50	5.3	5.2	220.02	215.69	.094	.098	.0076	.0075	.00920	.00890	0.98	1.01
Chicago, St. Paul, Minn. & Omaha	1,744	1,745	11,901	11,438	.....	463	3.89	6.8	6.6	157.87	157.22	.176	.185	.0102	.0105	.00902	.00868	1.13	1.21
Colorado & Southern	2,008	1,813	10,915	10,869	.....	46	0.42	5.4	6.0	150.86	148.02	.128	.145	.0095	.0104	.00940	.00931	0.98	1.10
Denver & Rio Grande	2,553	2,551	14,696	14,578	.....	118	0.80	5.8	5.7	105.83	116.44	.139	.132	.0093	.0090	.01240	.01210	0.85	0.84
Duluth, S. S. & Atlantic	612	623	3,009	2,923	.....	86	2.86	4.9	4.7	66.62	67.47	.174	.168	.0131	.0127	.00880	.00895	1.49	1.42
Great Northern	7,294	7,482	46,101	47,641	1,540	.....	3.34	6.3	6.4	232.23	226.11	.127	.121	.0071	.0066	.00809	.00768	1.06	0.99
Illinois Central	4,563	4,763	57,637	55,108	.....	2,529	4.39	12.6	11.6	243.10	135.79	.111	.113	.0072	.0074	.00609	.00610	1.42	1.45
*Iowa Central	559	.....	3,503	.....	.....	3,503	100.00	6.3	...	167.20	.....	.108	....	.0072	.....	.00601	.....	1.25	....
Kansas City Southern	827	827	5,636	5,479	.....	157	2.79	6.8	6.6	225.06	227.01	.085	.091	.0054	.0058	.00787	.00798	0.77	0.82
*Minneapolis & St. Louis	1,027	1,586	4,224	7,596	3,372	.....	79.83	4.1	4.8	107.59	156.70	.164	.131	.0119	.0089	.01093	.00758	1.20	1.33
Minn., St. Paul & Sault Ste. Marie	3,770	3,773	14,296	22,586	8,290	.....	57.99	3.7	6.0	213.61	225.39	.149	.118	.0133	.0083	.00815	.00702	1.64	1.19
Missouri Pacific	7,235	7,231	38,837	43,343	4,506	.....	11.60	5.4	6.0	212.99	218.00	.107	.112	.0074	.0075	.00715	.00824	1.03	1.10
Missouri, Kansas & Texas	3,395	3,398	24,916	24,804	.....	112	0.45	7.3	7.3	170.26	192.10	.143	.138	.0131	.0148	.01130	.01080	1.37	1.37
Northern Pacific	6,017	6,025	43,100	43,220	120	.....	0.28	7.1	7.2	278.80	289.40	.128	.126	.0075	.0074	.00903	.00867	0.97	0.96
St. Louis & San Francisco	5,188	5,241	29,242	29,646	404	.....	1.38	5.6	5.7	151.38	153.62	.123	.127	.0091	.0093	.01050	.01010	1.04	1.08
St. Louis Southwestern	1,487	1,548	10,934	11,512	578	.....	5.29	7.3	7.4	245.55	245.22	.146	.152	.0133	.0137	.01080	.01070	1.23	1.28
San Antonio & Aransas Pass	724	724	1,936	1,850	.....	86	4.44	2.7	2.6	147.92	151.09	.087	.074	.0111	.0095	.01630	.01625	0.68	0.58
Southern Pacific	10,202	9,970	47,454	47,448	.....	6	0.01	4.7	4.8	231.77	228.03	.092	.094	.0063	.0065	.01175	.01168	0.64	0.65
Texas & Pacific	1,885	1,885	10,957	11,096	139	.....	9.48	5.8	5.9	180.00	183 00	.097	.092	.0103	.0094	.01030	.01000	1.00	0.94
Union Pacific	6,678	7,150	28,377	29,255	878	.....	3.09	4.3	4.1	391.96	381.18	.065	.067	.0039	.0040	.01003	.00989	0.47	0.51
Wabash	2,515	2,515	20 587	20,350	.....	237	1.15	8.2	8.1	211.80	210.58	.072	.080	.0058	.0061	.00603	.00609	1.02	1.07
Total	118,223	119,805	738,734	765,908	27,174	.....	3.68	6.2	6.4	211.03	214.53	.119	.120	.0087	.0087	.00906	.00890	1.09	1.10
TOTAL ALL ROADS	190,006	192,769	1,845,951	1,894,123	48,172	.....	2.61	9.7	9.8	171.89	173.39	.127	.128	.0089	.0090	.00853	.00846	1.19	1.17

*1912 operations of Iowa Central included in Minneapolis & St. Louis.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILROADS OF THE UNITED STATES—1900 AND 1912.

Note.—Narrow gage cars excluded. Non-revenue cars excluded. Company freight included.

	Miles.		Frt. equipment.				Frt. cars per mile of road.			Average length of haul.		Freight Cars—Per 1,000 frt. car miles.		Freight Cars—Per 1,000 rev. ton miles.		Rate per ton mile. (Dollars.)		Freight cars per $1,000 frt. earnings.	
	1900.	1912.	1900.	1912.	Increase.	Decrease.	Per cent. of change.	1900.	1912.	1900.	1912.	1900.	1912.	1900.	1912.	1900.	1912.	1900.	1912.
New England Roads:																			
Boston & Maine	1,787	2,291	12,230	25,410	13,180	.....	107.77	6.8	11.1	66.99	103.86	.126	.115	.0146	.0103	.01440	.01089	1.02	0.95
Bangor & Aroostook	354	625	3,091	5,335	2,244	.....	72.51	8.7	8.6	89.62	125.51	....	.272	.0539	.0237	.01420	.01121	3.79	2.11
Central Vermont	513	536	2,006	3,451	1,445	.....	72.03	3.9	6.4	94.97	76.73	.063	.110	.0079	.0111	.00880	.00930	0.90	1.20
Maine Central	816	1,192	3,586	9,110	5,524	.....	154.04	4.4	7.6	81.11	90.16	.163	.163	.0123	.0149	.01130	.01088	1.09	1.37
New York, New Haven & Hartford..	2,008	2,092	13,116	38,053	24,937	.....	190.13	6.5	18.2	85.36	94.95	.076	.178	.0097	.0162	.01451	.01371	0.67	1.18
Total	5,478	6,736	34,029	81,359	47,330	.....	139.06	6.5	12.1	83.61	98.24	.107	.168	.0197	.0152	.01264	.01120	1.49	1.36
Trunk Line Roads:																			
Baltimore & Ohio	3,179	4,455	61,708	87,002	25,294	.....	41.41	19.3	19.5	194.81	193.04	.128	.106	.0068	.0070	.00412	.00580	1.96	1.20
Buffalo, Rochester & Pittsburgh....	472	570	8,858	16,625	7,767	.....	87.68	18.7	29.2	136.16	159.30	.139	.191	.0097	.0098	.00470	.00480	1.99	2.03
Central of New Jersey	639	669	15,002	22,015	7,013	.....	46.75	23.4	32.9	77.88	70.87	.153	.168	.0118	.0100	.00871	.00861	1.36	1.16
Chesapeake & Ohio	1,476	2,263	17,270	43,740	26,470	.....	153.27	21.6	19.3	302.00	256.00	.082	.125	.0058	.0065	.00343	.01043	1.71	1.60
Delaware & Hudson	665	878	13,030	19,712	6,682	.....	51.28	19.6	22.4	94.46	144.11	.147	.121	.0113	.0066	.00789	.00620	1.54	1.05
Delaware, Lackawanna & Western..	947	985	27,287	28,720	1,433	.....	5.25	28.8	29.2	151.00	170.50	....	.112	.0144	.0076	.00808	.00731	1.79	1.05
Erie	2,104	2,258	46,225	49,465	3,240	.....	7.01	21.9	21.9	194.40	184.61	.101	.104	.0089	.0072	.00559	.00583	1.60	1.24
Lehigh Valley	1,382	1,441	34,954	43,352	8,398	.....	24.03	25.3	30.1	188.08	160.42	.135	.142	.0106	.0087	.00542	.00646	1.97	1.40
New York Central & Hudson River.	2,817	3,791	59,180	71,693	12,513	.....	21.14	21.1	18.9	163.00	194.62	....	.084	.0088	.0061	.00560	.00626	1.72	1.10
New York, Ontario & Western	480	566	5,899	6,409	510	.....	8.65	12.3	11.3	142.38	145.29	.144	.110	.0121	.0074	.00816	.00758	1.49	0.98
Pennsylvania Railroad	3,716	4,092	80,385	139,346	58,961	.....	73.35	21.6	34.1	109.54	153.42	.091	.123	.0067	.0060	.00540	.00583	1.25	1.08
Reading	1,000	1,015	31,824	40,210	8,386	.....	26.35	31.8	39.6	89.42	93.82	.139	.135	.0114	.0079	.00831	.00704	1.50	1.13
Western Maryland	279	543	691	6,635	5,944	.....	860.22	2.5	12.2	51.02	94.55	....	.116	.0038	.0066	.00734	.00596	0.53	1.11
Total	19,176	23,526	402,313	574,924	172,611	.....	42.90	21.0	24.4	153.16	155.43	.098	.125	.0093	.0075	.00637	.00677	1.55	1.24
Southern Classification:																			
Atlantic Coast Line	1,759	4,568	5,378	27,233	21,855	.....	406.38	3.6	5.9	121.90	153.60	....	.131	.0143	.0148	.01401	.01230	1.02	1.21
Central of Georgia	1,196	1,915	5,041	10,302	5,261	.....	104.36	4.2	5.4	148.86	147.70	.107	.135	.0183	.0101	.01096	.01120	1.26	1.16
Florida East Coast	.....	642	.....	1,267	1,267	.....	....	...	2.0	.....	162.89	....	.057	.....	.0107	.....	.01772	....	0.60
Louisville & Nashville	3,007	4,740	23,402	44,727	21,325	.....	91.12	7.7	9.4	163.00	170.00	.096	.116	.0090	.0086	.00758	.00786	1.13	1.10
Mobile & Ohio	876	1,114	5,389	10,305	4,916	.....	85.64	6.2	9.2	195.63	223.70	....	.097	.0076	.0070	.00590	.00679	1.33	1.13
Nashville, Chattanooga & St. Louis.	1,189	1,230	5,328	9,943	4,615	.....	86.62	4.4	8.1	151.00	146.00	.113	.408	.0096	.0121	.00880	.01030	1.10	1.18
Norfolk & Western	1,551	2,018	18,656	42,065	23,409	.....	125.48	12.0	20.8	253.41	273.74	.085	.096	.0068	.0052	.00430	.00424	1.58	1.22
Norfolk Southern	147	608	409	3,019	2,610	.....	638.14	2.8	5.0	57.42	80.81	....	.249	.0161	.0226	.01770	.01643	0.91	1.38
Seaboard Air Line.....(1901)	2,604	3,059	8,335	15,846	7,511	.....	90.11	3.2	5.2	153.32	147.87	.119	.115	.0136	.0100	.01180	.01110	1.14	1.03
Southern Railway	6,306	7,088	26,814	50,919	24,105	.....	89.90	4.2	7.2	168.82	154.58	.107	.127	.0116	.0098	.00916	.00987	1.27	1.23
Total	18,635	26,982	98,752	215,626	116,874	.....	118.35	5.3	8.0	157.04	166.09	.105	.153	.0119	.0111	.01002	.01078	1.19	1.12
Central Classification:																			
Chicago, Indianapolis & Louisville...	546	617	5,440	6,769	1,329	.....	244.30	9.9	11.0	153.00	133.60	.155	.178	.0141	.0117	.00757	.00826	1.86	1.59
Cincinnati, Hamilton & Dayton.....	652	1,015	7,838	11,281	3,443	.....	43.93	12.0	11.1	108.96	122.63	....	.144	.0122	.0082	.00610	.00535	2.00	1.57
C. C. C. & St. Louis	1,891	2,012	15,484	24,490	9,006	.....	58.16	8.2	12.1	169.30	152.30	.094	.087	.0083	.0057	.00583	.00543	1.42	1.10
Grand Rapids & Indiana	582	578	3,015	3,207	192	.....	6.37	5.2	5.6	90.12	96.73	.140	.099	.0156	.0063	.00870	.00707	1.88	0.98
Lake Erie & Western	725	906	5,549	3,150	.....	2,399	43.23	7.6	3.5	153.51	123.98	.137	.061	.0110	.0042	.00614	.00656	1.89	0.68
Lake Shore & Michigan Southern...	1,411	1,872	19.958	54,861	34,903	.....	174.88	14.1	29.3	178.00	159.50	.067	.123	.0055	.0076	.00505	.00529	1.09	1.51
Michigan Central	1,635	1,817	14,219	26,227	12,008	.....	84.45	8.6	14.4	193.50	145.00	....	.099	.0070	.0078	.00592	.00664	1.19	1.23
New York, Chicago & St. Louis....	513	523	6,743	12,622	5,879	.....	87.19	13.1	24.1	297.00	196.00	.059	.082	.0055	.0060	.00478	.00502	1.16	1.23
Pennsylvania Company	1,396	1,751	43,967	59,328	15,361	.....	34.94	31.5	33.9	77.95	79.85	.177	.137	.0135	.0068	.00590	.00572	2.30	1.25
P. C. C. & St. Louis	1,407	1,472	12,884	27,596	14,712	.....	114.19	9.1	18.7	111.14	125.82	.056	.079	.0052	.0048	.00620	.00580	0.84	0.89
Pere Marquette	1,821	2,330	7,944	17,943	9,999	.....	125.87	4.3	7.7	112.64	167.86	....	.132	.0124	.0094	.00802	.00643	1.55	1.59
Vandalia	727	827	5,922	8,832	2,910	.....	49.14	8.1	10.7	74.46	107.40	.121	.118	.0119	.0076	.00718	.00648	1.66	1.22
Total	13,306	15,720	148,963	256,306	107,343	.....	72.06	11.2	16.3	143.63	134.22	.112	.112	.0102	.0072	.00645	.00617	1.57	1.24
Western Classification:																			
Atchison, Topeka & Santa Fe	7,426	10,733	27,486	62,241	34,755	.....	126.45	3.7	5.8	349.19	329.59	.073	.092	.0079	.0070	.00976	.01026	0.81	0.87
Chicago & Alton	855	1,026	9,386	11,756	2,370	.....	95.25	10.9	11.5	176.16	152.72	.135	.100	.0148	.0068	.00794	.00576	1.87	1.26
Chicago & Eastern Illinois	711	1,275	8,206	25,516	17,310	.....	210.94	11.5	20.0	144.70	146.21	.132	.209	.0096	.0115	.00483	.00530	1.99	2.29
Chicago & Northwestern	5,219	7,960	40,846	59,098	18,252	.....	44.68	7.8	7.4	151.30	138.11	.108	.194	.0106	.0115	.00830	.00910	1.28	1.27
Chicago, Burlington & Quincy	7,546	9,074	42,287	55,726	13,439	.....	31.78	5.6	6.1	254.87	254.92	....	.092	.0111	.0073	.00851	.00752	1.29	0.97
Chicago Great Western	930	1,496	5,782	11,294	5,512	.....	95.33	6.2	7.5	301.68	222.66	.087	.115	.0081	.0084	.00720	.00725	1.13	1.27
Chicago, Milwaukee & St. Paul.....	6,423	7,296	35,740	45,778	10,038	.....	28.01	5.6	6.3	189.07	192.12	.093	.096	.0106	.0077	.00929	.00839	1.14	1.07
Chicago, Milwaukee & Puget Sound.	.....	2,059	.....	11,959	11,959	.....	....	...	5.8	.....	542.51	....	.109	.....	.0074	.....	.00833	....	0.92
Chicago, Rock Island & Pacific.....	3,647	8,036	17,150	41,798	24,648	.....	143.72	4.7	5.2	213.00	215.69	.094	.098	.0096	.0075	.00990	.00890	1.08	1.01
Chicago, St. Paul, Minn. & Omaha..	1,557	1,745	10,253	11,438	1,185	.....	11.56	6.6	6.6	160.55	157.22	.149	.185	.0135	.0105	.00971	.00868	1.39	1.21
Colorado & Southern	762	1,813	2,979	10,869	7,890	.....	264.85	3.9	6.0	101.00	148.02	.108	.145	.0115	.0104	.01242	.00931	0.93	1.10
Denver & Rio Grande	1,674	2,551	8,359	14,578	6,219	.....	74.40	4.9	5.7	.....	116.44	.118	.132	.....	.0090	.....	.01210	1.09	0.84
Duluth, S. S. & Atlantic	585	623	2,697	2,923	226	.....	8.38	4.6	4.7	49.07	67.47	....	.168	.0209	.0127	.01221	.00895	1.70	1.42
Great Northern	5,418	7,482	21,484	47,641	26,157	.....	121.75	3.9	6.4	192.00	226.11	.104	.121	.0085	.0066	.00899	.00768	0.93	0.99
Illinois Central	3,996	4,763	32,439	55,108	22,669	.....	69.88	8.1	11.6	213.83	235.79	.092	.113	.0094	.0074	.00651	.00610	1.45	1.45
*Iowa Central	510	.....	2,238	.....	.....	2,238	100.00	4.4	...	152.30	.....	.099	....	.0084	.....	.00696	.....	1.21	....
Kansas City Southern	833	827	5,118	5,479	361	.....	7.05	6.1	6.6	304.41	227.01	.118	.091	.0091	.0058	.00613	.00798	1.49	0.82
*Minneapolis & St. Louis	597	1,586	3,066	7,596	4,530	.....	147.75	5.1	4.8	108.79	156.70	.196	.131	.0155	.0089	.01212	.00758	1.45	1.33
Minn., St. Paul & Sault Ste. Marie.	1,255	3,773	6,631	22,586	15,955	.....	240.61	5.3	6.0	194.65	225.39	.129	.118	.0109	.0083	.00658	.00702	1.67	1.19
Missouri Pacific	4,938	7,231	25,186	43,343	18,157	.....	72.09	5.1	6.0	236.24	218.00	.102	.112	.0095	.0075	.00834	.00824	1.15	1.10
Missouri, Kansas & Texas	2,218	3,398	9,669	24,804	15,135	.....	156.53	4.4	7.3	298.93	192.10	.073	.138	.0082	.0148	.00840	.01080	0.98	1.37
Northern Pacific	5,006	6,025	23,138	43,220	20,082	.....	86.79	4.6	7.2	309.60	289.40	.105	.126	.0104	.0074	.00987	.00867	1.04	0.96
St. Louis & San Francisco.....	† 1,659	5,241	5,974	29,646	23,672	.....	396.25	3.6	5.7	182.05	153.62	.093	.127	.0114	.0093	.01058	.01010	1.08	1.08
St. Louis Southwestern	1,258	1,548	5,386	11,512	6,126	.....	113.74	4.3	7.4	196.28	245.22	.127	.152	.0130	.0137	.01110	.01070	1.17	1.28
San Antonio & Aransas Pass	687	724	1,553	1,850	297	.....	19.12	2.3	2.6	162.26	151.09	.113	.074	.0142	.0095	.01861	.01625	0.95	0.58
Southern Pacific	7,576	9,970	29,413	47,448	18,035	.....	61.32	3.9	4.8	307.31	228.03	.096	.094	.0062	.0065	.00957	.01168	0.73	0.65
Texas & Pacific	1,570	1,885	6,263	11,096	4,833	.....	77.17	3.9	5.9	231.77	183.00	.079	.092	.0093	.0094	.01030	.01000	0.91	0.94
Union Pacific	5,428	7,150	21,826	29,255	7,429	.....	34.04	4.0	4.1	305.68	381.18	.080	.067	.0082	.0040	.01046	.00989	0.78	0.51
Wabash	2,340	2,515	13,087	20,350	7,263	.....	55.49	5.6	8.1	216.70	210.58	.071	.080	.0068	.0061	.00558	.00609	1.23	1.07
Total	82,624	119,805	423,642	765,908	342,266	.....	80.79	5.0	6.4	211.25	214.53	.104	.120	.0106	.0087	.00926	.00890	1.21	1.10
Total All Roads	139,219	192,769	1,107,699	1,894,123	786,424	.....	71.00	8.0	9.8	184.09	173.39	.105	.128	.0112	.0090	.00854	.00846	1.36	1.17

*1912 operations of Iowa Central included in Minneapolis & St. Louis. † Before consolidation with other companies.

THE NORTH HAVEN COLLISION.

Details of the Cause of this Disastrous Wreck and Full Statements of Officers as to Preventive Measures Adopted.

The rear collision of passenger trains on the New York, New Haven & Hartford at North Haven, Conn., September 2, in which three sleeping cars were wrecked, was reported in the *Railway Age Gazette* last week, page 427. The final report of the number of persons killed was 21, all of them passengers, and of injured, about 30. Three of the injured are still in a critical condition. The explanation of the cause as given last week was in the main correct, except in the matter of distances. The leading train, second 91, which we shall call 91, ran nearly, or quite past the stop signal, signal No. 23, before it came to a stop. The evidence seems to be conflicting as to whether the rear car had not passed the signal or had gone from 50 to 150 ft. beyond it. The other train, first 95, which we shall call 95, appears to have been running about 40 miles an hour when the engineman came in sight of the flagman, the fixed signal and the rear of the preceding train, all at nearly the same instant. Most of the testimony was to the effect that nothing was visible beyond from 250 ft. to 350 ft. anywhere around the scene of the collision, because of the fog; but an officer of the Pennsylvania Railroad, L. R. Zollinger, engineer of maintenance of way, who was on the leading train, testified that, in conjunction with another passenger, he had made careful note of the distance at which the telegraph poles could be seen, and he said that five poles—that is to say, a distance of 750 ft., could be well seen, and he could discern the seventh pole (1,050 ft.).

The starting of train 91 and its immediate stoppage thereafter appears to have been occasioned, not by a purpose to get the train into the next block section, but by the differing purposes of the conductor and the engineman. The brake on one car had to be bled, or, at least was bled, and as soon as all brakes were released the engineman started. But the conductor desired to call in the flagman, and so he at once signaled the engineman to sound the whistle for that purpose. The distance that the train moved forward in the meantime is estimated variously from five feet to the length of one or two cars. Flagman Murray went back not more than from 100 ft. to 300 ft. and his torpedoes were put on the rail apparently not more than that distance back from the train. The next block signal in the rear was signal No. 25, about 7,350 ft. back. There are no distant signals or indications, and no overlaps. The estimates of the time that No. 91 had been standing before it was struck by No. 95 vary. The longest estimate is six minutes. At the last preceding station, three miles back, No. 95 was recorded eight minutes behind No. 91.

The foregoing details are gathered from the testimony taken before Interstate Commerce Commissioner McChord at New Haven, September 4 and 5. The three members of the Connecticut Public Utilities Commission, Messrs. Higgins, Ford and Hale, sat with Mr. McChord. The questions were asked by Chief Inspector Belnap of the Commission, and there was some cross-questioning by J. F. Berry, of the legal department of the New Haven road. In the following paragraphs we summarize the principal features of the testimony which have not already been covered.

The train despatcher for this section of the road gave the record of five trains which were run from Springfield to New Haven that morning, of which the two which were in collision were the fourth and fifth. South of Hartford a sixth train, a local passenger, was put in between the second and third. All of the trains lost time on account of the fog and the necessity of slackening speed to read the block signal indications. The six trains passed Wallingford, three miles north of the point of collision, at 6:19, 6:21, 6:32, 6:35, 6:43, and 6:51. According to the station records the last train, No. 95, ran from Meriden, 6 miles, to Wallingford, faster than any of the others. Mr. Belnap estimated the speed at 51 miles an hour, from the record; and the schedule speed was 38 miles an hour.

Shortly before No. 95 arrived at Wallingford, the despatcher directed the operator at that station to display a stop signal for all southbound trains, for the reason that he had heard that the first one of this succession of trains had not reached Air Line Junction, a telegraph station further south; he feared that possibly there might be a blockade and that it would be necessary to run southbound trains on the northbound track from Wallingford. Soon, however, he heard that the delayed train had reached Air Line Junction and he annulled the order to display the stop signal.

Engineman R. W. Wands, of second 91, told of his experience. He was stopped by signal 83, a few miles after he had left Springfield. The fog was dense and he over-ran the signal a short distance. He made an emergency application of the brakes. He stopped there six or seven minutes. He did not give the whistle signal for the flagman to go out, nor did he call the flagman in. He was again stopped at signal 77, near Hartford, and he made the regular stop at Hartford station. Then he found no signal against him until he got to No. 23. At all of these signals the distance that they were visible was, he estimated, about 200 ft. At No. 23 he over-ran the signal, he thought about seven car lengths (there were 11 cars in the train). He was three or four minutes getting the brakes released, not so long as at signal 83, and then he started, first sounding two blasts of the whistle; but the conductor at once gave a stop signal and he stopped, and called in the flagman. This he did twice, for the reason that the whistle blasts the first time were not very loud. The conductor was on the ground near the baggage car, which was the first car in the train. After calling in the flagman the time that elapsed before the collision he thought was about two minutes. He could not tell how far his train was pushed forward by the collision.

He did not know how far he had moved after he started, before the conductor ordered him to stop; he did not take much notice; perhaps one or two car lengths. Asked if he had trouble in stopping at the signals on this division in very foggy weather he said that he did, very much; and he admitted that he sometimes overran the signals. He considered the system without distant signals less safe than one with distant signals. Asked if the enginemen's objection to a system without distant signals had been reported to the company he said that he understood that the committee had brought the matter to the attention of the officers. This was in June, 1912. He did not know whether anything had been done about it. He had never been disciplined for running past signals, nor had he ever reported a case to his superiors. Asked if there had been surprise checking, Wands did not know; he had heard of such a thing but had no personal experience. Asked how fast he could safely run on that line in foggy weather, he thought not over 10 or 15 miles an hour.

Wands was made engineman in January, 1907; a new book of rules was issued in June of that year, and on this book he had not been examined. However, he had looked the book over and said that the rules were practically the same as in the old book.

Cross examined by Mr. Berry, Wands admitted that the road foremen and other officers had talked with him and had told him always to sacrifice speed to safety. Road foremen had ridden with him several times, but he could not say when or how often.

D. T. Barnfather, fireman with Wands, testified, corroborating in general Wands' testimony as to the circumstances of the trip and the collision. At signal 83 he thought the engineman did

not order out the flagman, neither did he call him in. Approaching signal 23 he did not see it; the first he knew, the engineman applied the brakes in emergency.

Mr. Belnap: "How far do you think you ran by signal 23?"

Mr. Barnfather: "Not over seven car lengths, I should say."

He thought they stopped two or three minutes; then the engineman sounded two blasts of the whistle and started (and was at once stopped by the conductor). Another two or three minutes elapsed before the collision. Barnfather had known of enginemen passing stop signals; had never heard of a report of such things being made

Brace C. Adams, conductor of 91, is 44 years old (not 35 as reported last week). He said that his train ran past signal 83 about half its length; that his flagman at once went back to flag the following train (95); and that the flagman went back until he met 95 and stopped it. No. 95 pulled right up behind his train and stopped; Adams' flagman came back and the train proceeded; No. 95 was standing there when he left. (This statement about the flagman and train 95 was contradicted by later witnesses.)

On stopping at signal 23 Adams was at about the fourth or fifth car. He looked back, and although he could not see the flagman distinctly, he saw enough to show that the man was starting back; but the first positive evidence he had that the flagman had gone back was when he heard the torpedoes explode (it was now daylight). He had not had this flagman on his train before for several weeks, but he had worked with him at times in the past and had repeatedly told him that he wanted "long flagging." Adams thought that the train moved forward only about half a car length before he stopped it by his order.

Asked why he called in the flagman, knowing that 95 was so close, he replied that otherwise he would have got into New Haven without any trainmen, as he would probably be stopped at other signals. He expected the flagman to use his judgment; if he had not come in promptly Adams would not have waited for him.

Conductor Adams, asked if he had had occasion to instruct or censure Flagman Murray, replied that once or twice he had; in one case about two months ago. Adams repeated that he had told Murray that he wanted long flagging. Asked if any officer of the road had been over the road with him as instructor he said no, except that when he first began running as conductor, the trainmaster rode with him on the way freight two days. Asked by the counsel of the road why he had not reported cases where enginemen ran past signals, he had no satisfactory reply. Mr. Berry quoted to him the rules, including one which empowered the conductor to suspend a man if necessary in case of violation of rules. Adams acknowledged that he knew all these rules.

C. H. Murray, flagman of No. 91, is 23 years old. He has been in the service since September 26, 1912, or a little less than one year. He was employed first as spare freight brakeman at Holyoke, Mass., on the Northampton division. He testified that he did not go back to flag at signal 83, as was said by Conductor Adams; he never saw train 95 until it struck his train at signal 23. In this Murray was emphatic. He was subsequently corroborated by other witnesses.

Shortly before the stop at signal 23, Murray saw Adams on the platform of the next to the last car, but did not speak to him; he does not know that Adams saw him. When the train stopped at signal 23 he got off and walked back; asked about signal 23, he said that he did not see it; never noticed it; he was pretty sure that it was not ahead of him, for he looked ahead and did not see it, although he was on the right side of the train to see it. When he put down the torpedoes he was near enough to the train so that, notwithstanding the fog, he could see a porter wearing a white coat, standing near the rear car. After putting down the torpedoes and starting back for the train, in response to the whistle signal, he heard train 95 coming and started to light a fusee, but he did not have time to do so and started north running and swinging his red light; but the train was upon him before he had done anything effectual. When train 95 came to a stop after the collision its rear car had not passed Murray; he could not tell exactly where he was; he at once ran forward. After running a short distance he climbed up on to the rear platform of the baggage car to reach the other side of the train.

He did not remember that any conductor had ever reprimanded him for poor flagging or ever had instructed him as to his duties. He said that in testifying on a previous day, before an officer of the road, to the effect that he had gone back six or seven telegraph poles he had been mistaken; it must have been considerably less than that. Murray had no watch.

Cross-examined by Mr. Berry, Murray said that he knew the flagging rules perfectly; he also admitted that he had been talked to by Trainmaster Regan and that he had been called to account for forgetting to put the markers on his train on one occasion. He professed not to remember definitely anything which had been said by the trainmaster.

It appears that flagmen who run on freight trains are required to take a more thorough examination than other flagmen, because of the liability that they may have to act for the conductor, at times, when the conductor is at the forward end of a long train. Murray's statement that he had not taken this examination made it appear that he was not a "qualified flagman."

F. L. Bunday, baggageman of second 91, looked out at the side door when his train stopped at signal 23, but he could not see the signal; neither could he see the rear end of the train; he did not know whether the train was entirely past the signal. He judged that the stop lasted about five minutes in all. When the train started it moved about the length of half a car, he estimated. The conductor, standing on the ground two or three cars back, shouted to call in the flagman and Bunday repeated the order.

S. F. Evans, chairman of the Locomotive Engineers' Brotherhood, presented the correspondence which had been had between himself and the general superintendent in August, 1912, when the several divisions of the brotherhood protested against the use of block signals of any kind without a distant indication. The men on the Hartford division first formulated the complaint and then those on other divisions endorsed it. The general superintendent sent a reply, calling attention to the fact that all of the enginemen knew the road, knew where the signals were located and knew the rules about observing them. To the charge that discipline had been drastic and unreasonable he replied that the number of cases of dismissal or discipline of any character for disregarding signals, in the territory referred to, had been very small—probably not more than one case in the past year; and he said that practically all of the cases where signals had been overrun had occurred at points protected by distant signals. He enlarged on the fact that the New Haven road had made a good record of freedom from accidents to passenger trains, which could not have been possible with poor appliances.

In a subsequent letter Mr. Evans, supporting his charge of unreasonable discipline, said, "If any of our men do not take these chances and make the time there is a continual prod after them every day they do not make it, and it is one of the things that I hear almost every day from the men, saying they got letters from the superintendent that they lost a minute or more, and in some cases they are told that they will not stand for any loss of time; the other men make it and the time has got to be made."

Engineman August B. Miller was the first witness Friday afternoon. Miller gave his age as 47 (not 27, as previously reported). He said he had been an engineman since July 14, 1903. Of the 77 block signals between Springfield and New Haven, 62 miles, he thought that only about a dozen had distant signals or distant indications. Asked what his experience had been on this division in foggy weather, he replied, "I have

had very good luck. We have had considerable foggy weather in the last 10 days and I have been cautious, and I have been unusually fortunate to stop at my signals." He has run on this division about eight or nine years. He had been on this train regularly about two months. It is a summer train. (Miller here gave the times as they are shown in a table which is given on our editorial page.) To Mr. Belnap's question if he had opportunity to sleep from nine o'clock Monday morning until ten o'clock Monday night, he replied: "Yes," but modified this by saying that he was ordered out of the house at 9 p. m., leaving 12 hours for sleep.

Mr. Belnap: "So that each time you went to Stamford, you got 12 hours sleep?"

Mr. Miller: "Yes, sir."

Mr. Belnap: "And you had time for two or three hours' rest at Springfield each trip?"

Mr. Miller: "Yes, sir."

Asked about the condition of the air brakes on leaving Springfield, he said that they were reported to him all right; but on further questioning recalled the fact, which he had forgotten, that the baggage car had no air brakes. On this car the brakes had had to be cut out because one brake beam was out of order. This left Miller with six cars braked and one unbraked.

Recounting the trip, Miller said he was stopped first by a signal in the Springfield yard; he thought the stop was about five minutes. The next stop was at Hartford.

Mr. Belnap: "Weren't you flagged and stopped at signal 83 by the flagman on the rear of train No. second 91?"

Mr. Miller: "No, sir."

Mr. Belnap: "Didn't you see second 91, and stop behind it?"

Mr. Miller: "No, sir."

Miller found signal No. 25 clear. He called the signal to the fireman. It was visible, he thought, about 200 ft. At signal 23 he estimated the length of the view about the same.

Mr. Belnap: "You expected, of course, to find signal No. 23 clear?"

Mr. Miller: "I certainly had no other idea. . . . The first thing I saw was the flagman and I had no more than seen the flagman before I struck the torpedoes; I looked up and saw I had my banjo against me, and the rear end of that train ahead of me."

Miller estimated that the flagman was about 90 ft. back of the train and about 45 ft. back of the signal. The torpedoes, he thought, were 45 ft. back of the flagman. The flagman stood in the ditch, swinging a flag crosswise. Miller had no time to jump and had no thought of any such thing. Miller at this point, answering further questions, told of his time off at Stamford on the day before the collision, giving the facts as shown on our editorial page. He said that he arrived at his house at 11:30, ate his dinner and got to bed about 12 o'clock. He slept four hours and a half at home and lay down about two hours at Stamford in the evening. (The record of the testimony at this point indicates that Miller stated that this was his regular daily routine; but on the next day, from his further statements, it appears that this was the case only when he was running every day, which was only for a week preceding the collision. Prior to that time he ran only every other day, and spoke of the "long days" of rest.)

Mr. Belnap: "Were you in any way sleepy on that trip?"

Mr. Miller: "Not at all; no, sir."

Mr. Belnap: "You are certain that signal 25 was white?"

Mr. Miller: "I am."

Asked if he had ever overrun signals, he recalled one case nine years ago. Asked if he had a collision at that time, he replied that he thought not. Mr. Belnap, quoting from the records, asked about a case in February, 1911, but Miller said that on that occasion he had run past a signal because the brakes did not hold. This was a freight train, and there was a collision. Asked how he could account for his over-running at signal 23, after such a good record, he replied: "It was on account of the fog. There was no stated point where that signal was. I had no stated mark to look for and, on account of the fog being so heavy, it was hard to distinguish the exact point where it was." From Meriden to Wallingford he judged that he was running about 35 to 40 miles an hour. "Would you be surprised if the train sheet showed that you made 51 miles an hour?" "I should, sir, be very much surprised." The schedule of train 95 averages 38 miles an hour over the division. Miller, in answer to a question, thought that he could run 40 to 50 miles an hour in foggy weather and be prepared to stop at every signal.

Mr. Belnap: "Do you think that the system of signalling would be much safer if it had a caution indication?"

Mr. Miller: "If you had had a caution indication there, you gentlemen would not be here."

Miller had run over two torpedoes at Meriden freight house. He did not know how these came there, but there was a freight train standing on another track at that station doing work.

On further questioning, Miller thought that with dense fog all along the road he should not try to make more than 25 or 30 miles an hour. His previous higher estimate was based on the assumption that at some of the signals he could get a better view. Miller had never reported the unsatisfactory condition of the signals, but knew that the brotherhood had made a complaint (referred to above).

Mr. Berry, on cross-examination, brought out the fact that since February, 1911, Miller had had a clear record. Miller acknowledged having attended a meeting at the superintendent's office on the day previous to the Stamford collision, where enginemen were enjoined to be strictly careful and try to run trains safely over the road. "And I have tried faithfully from that day to this to live up to the rules."

The records being read by Mr. Berry, Miller recalled interviews with Foreman Buckley, Road Foreman Burke and Road Foreman Daily. Road Foreman Buckley had ridden with him; he could not recall the date. It was sometime in August. After one meeting at the superintendent's office the superintendent talked with Miller separately. Miller recognized a safety circular which had been issued by the superintendent on August 29.

Miller could remember only two occasions when road foremen of engines had ridden with him; one of these was when the new engines were put into service, a few months ago.

Elbert A. Robertson, Miller's fireman, 31 years old, in service 27 months, testified that signal 25 was clear and that the engineman called it to him and he answered. He thinks he saw the rear of the standing train, No. 91, before the torpedoes exploded. In foggy weather Robertson had known of numerous cases of running past signals short distances—from 2 to 6 or 8 cars. Cases of this kind may have occurred as often as once a week. He testified to being a regular passenger fireman on this section of the road, but his statement concerning overrunning does not show what train he was on or what engineman he was with. Robertson had never been examined on the book of rules and had not been required to carry a watch; he had, however, received a book of rules. He had been examined as to eyesight and hearing. The representative of the company who employed him thought that instructions were unnecessary because of his previous experience; he had been on the New York Central 7 years.

Mr. Belnap: "Did they occasionally run by automatic signals over there the same as here?"

Mr. Robertson: "Yes, sir."

Robertson, in company with Engineman Miller, and Mr. Daily, after the collision, went back and found where the torpedoes had been exploded. The distance from the train he judged was 60 to 70 ft.

Mr. Berry, in cross-questioning, elicited from Robertson a statement that when he came to the New Haven from the New York Central he was familiar with the rules and with automatic signals. Asked about differences between the two roads, he said: "Over there they are working under what is known

as the standard code of rules, while here we are not working under the standard code."

Mr. Berry: "That is to say, the rules are a little bit different?"

Mr. Robertson: "They are a little bit different."

Asked by Mr. Belnap if flagmen properly protected their trains, he replied: "Of late we have not had so much trouble as we did sometime ago. There was a time when we had some young men here who were called 'piazza flagman'; but the trainmasters have been watching them so closely that they have been living up to the rules better of late." Though having known of numerous instances where flagmen did not protect their train, Robertson had not heard that anybody reported these occurrences.

Lambert H. Fowler, conductor of No. 95, has been a conductor 13 years. He testified to the cutting out of the brakes of the baggage car at Springfield, leaving a little over 85 per cent. of the cars in the train braked. He could recall only one or two cases previous to this when brakes had had to be cut out. He thought that at the time of the collision the train was running 35 or 40 miles an hour. After the collision he thought that his third car was opposite signal 23. He had not stopped at signal 83. He thought that he could see from 300 to 350 ft. in the fog. His last examination on the book of rules was about two years ago. He remembered not more than two or three times where an engineman had run past a signal, and then not more than one or two car lengths.

Edward A. Kitchen, front brakeman of No. 95 testified to going ahead and stopping a northbound train. He thought that he could see through the fog perhaps five car lengths. Kitchen had been examined on the book of rules when promoted from freight to passenger service. Asked about the difference between a trainman and a flagman, he said there was none in the passenger service. In the freight service a flagman is the next grade above a trainman and below the conductor, but in the passenger service the baggage master is in that position.

L. R. Zollinger, engineer of maintenance of way of the Pennsylvania Railroad, who was a passenger on No. 91, testified concerning the fog. Meeting a friend who had been on the other train, he went with him back and observed the telegraph poles. They could clearly distinguish the cross arms on the fifth pole; could see the sixth pole and the outline of the seventh, though not near the ground, the fog being thicker for about two feet from the surface of the earth. This was about eight minutes after the wreck. Afterwards the fog became a little thicker, but even then he could distinguish the seventh telegraph pole, which was certainly 1,000 ft. from him. Mr. Zollinger took his observations on the east side of the train and had taken no notice of signal 23 at that time. He did not measure the distance of the telegraph poles from one another, but said it was at least 150 ft.

H. A. Clark, car inspector, testified about the broken brake beam on the baggage car when it was delivered to the New Haven by the Boston & Maine at Springfield. He could not have put in another brake beam without taking the car to the yard, some distance from the station, as the train at the station was standing on the main track of the Boston & Albany. It would have taken at least an hour to put in a new brake beam. Asked if there had been any change in the methods of inspection since the Stamford collision, Clark replied that more attention is now paid to the triple valves and to piston travel on all cars. A record is kept of all inspections of this kind, so that the piston travel on any car at any time can be known. As to repairing cars received from other roads, if the work can be done in five or six minutes, it is done; otherwise, if not serious, the air is cut out, and if necessary to maintain 85 per cent. of braking power, the car is cut out.

D. W. Wildin, mechanical superintendent of the road, testified concerning mechanical details. He has been mechanical superintendent on this road six years. The inspection rules allow trains to be run if they have 85 per cent. of the cars air braked. The baggage car of No. 95 was an important car, containing as it did all the baggage of the passengers on the train. This was the first instance that he recalled since the records had been kept in which brakes had to be cut out on a passenger train.

J. A. Droege, superintendent of the division, testified concerning discipline and other general conditions on the division. He has been here since December, 1912, and prior to that was superintendent of the Providence division for nine years. The daily average number of passenger trains northbound between New Haven and Springfield in the month of August was 19.5; southbound, 18.8; freight trains, 8.1 northbound and 8.0 southbound. The trainmasters and the men designated as examiners, examine every new man as soon as possible; except in extreme emergencies a man must be examined before he is put to work.

Referring to the matter of examinations, Mr. Droege said that the term "qualified flagman," as used by a previous witness, meant that such a man was qualified to act in emergencies as conductor. The trainman who testified meant to say that he had not thus been examined concerning a conductor's duties. All trainmen, both freight and passenger, are qualified as flagmen when they enter the service. There is no rule requiring flagmen to have watches. No conductor shall go out with more than one inexperienced man in his crew. As to re-examination of men, the records prior to Mr. Droege's taking this position are imperfect. At present five men are at work examining all of the trainmen whose names do not appear on the record as having been examined within a reasonable time. Asked about watches, Mr. Droege said that the company did not insist that flagmen should carry standard watches. There is a rule requiring conductors, enginemen and brakemen to compare watches; but this is not intended to apply strictly in a case where the flagman's watch is not a standard watch. The trainmasters, as they go over the road, ask flagmen if they have watches; but they do not require these to be standard. The superintendents question the men in the same way; Mr. Droege had never encountered a flagman who did not have a watch.

Mr. Droege has eight trainmasters and assistant trainmasters; territory 440 miles; number of men in train service about 2,600. The trainmasters ride over the road to investigate and instruct the road foremen of engines.

Commissioner McChord: "Do you think that is a sufficient number?"

Mr. Droege: "Well, I should say it was."

Commissioner McChord: "Here is an instance of this young man; you never knew whether he had a watch or not. This is a small matter, but what we are trying to find out is what discipline you have. If you lack discipline in little things you are likely to overlook it in big things."

Questioned about overrunning of signals Mr. Droege said that very few cases had been reported.

Mr. Belnap: "What about these cases spoken of at this hearing as occurring so frequently?"

Mr. Droege: "I don't know anything about the cases that we don't know about."

Questioned about inspections, Mr. Droege said that the trainmasters and road foremen went out on the road, and also the officers had talked to the men and cautioned them; also had watched train movements. Mr. Droege agreed that automatic signals were safer with distant indications. Asked how long he had been of that opinion he replied: "Since I was old enough to know anything about the signal situation." The installation of distant signals between New Haven and Springfield was ordered soon after Mr. Droege came to this division.

Asked about the practice generally on the road in regard to checking obedience to signals, Mr. Droege said that he could answer only as to his own work. When he came to this division he at once called a staff meeting and urged his officers to get out on the road as much as possible; impress the men with the importance of observance of rules; take care never to urge any engineman to run faster, or to question him about his speed

either by word of mouth or in writing; to instruct train despatchers to make record of every irregularity. He thought that these injunctions had been vigorously carried out. On March 10 another staff meeting was held and orders given to interview all of the enginemen. Another meeting was held on April 6 and the same subject again gone over. Staff meetings also were held on June 2, June 9, July 21 and August 25 for the same purpose. Also 12 or 15 meetings were held with enginemen and conductors at division terminals. Mr. Droege himself had personally interviewed between 150 and 200 men. The trainmasters were instructed so as to insure that their talks to the men should be uniform. A list was made of all conductors and enginemen against whom there were questionable things on their records and these were spoken to individually. Engineman Miller was one of these—though his record had been clear for two years and six months. Miller, and one other man interviewed at the same time, "were in a receptive mood and took the admonitions in good part; they promised without hesitation that they would do the best they could, and I believe they meant it. In that talk, as in all others, I invariably laid emphasis on the question of signal observations, and told the men that in cases of difficulty in reading signals, or finding a signal, whether in foggy or stormy weather conditions, or for any other reason, that all they had to say was they lost time because of their difficulty in reading the signal, or finding and locating signals, and I said there would never be any question raised; and I don't believe there has been any question raised with any man who reported delay for that cause. I used the expression, I remember it, 'If necessary, they should anchor there until they knew what the signal position was.' I didn't care how slow they had to run or how long they stayed there; and to support my statements as meaning what I said, I can refer to any number of cases where men have lost on that Springfield line all the way from two minutes to thirty, on a run, ascribing it to fog, and there never has been a question with them, so far as I know. In fact, I have asked the enginemen, in meetings afterwards, whether they were being criticized. In a few cases they said the question had been asked, 'What caused the delay?' but nothing beyond that. The trainmasters talked to them on the same lines."

Asked if anybody had gone out to see whether these instructions were obeyed, Mr. Droege replied that everybody was out as much as possible. He himself had spent all the time he could on the road. He believed the general performance of enginemen had been very much better than a few months ago; also there had been fewer cases of poor flagging. There are too many cases of signals being overrun, but he believed that this record was the result of requiring more faithful reports than had been required in the past. He had discharged an important transportation officer a few months ago because he did not report a case of overrunning of a signal which he had known of. Asked further about discovering delinquencies Mr. Droege said that in addition to the inspections "we get a good many reports from a large number of the men who are sufficiently honorable and conscientious to report those things, to keep other men out of trouble."

Mr. Berry here put into the record the circular of August 29 which had been referred to in the examination of Miller, and also a circular issued on June 1.

Answering a question of Commissioner Higgins, witness said that Flagman Murray had been assigned to his position by Trainmaster Regan.

Edward E. Regan, trainmaster on this section of road, gave testimony concerning the selection of men. He has been trainmaster two years, and before that was assistant trainmaster two years, and prior to that assistant general yardmaster at New Haven; had been clerk and stenographer and chief clerk to the superintendent. He had never been examined on the book of rules.

Trainman Murray had been assigned by Crew Despatcher Doolan. Murray was examined on the rules by Messrs. O'Neil and Jolson, the regular examiners. Replying to a question from Mr. Berry, Mr. Regan said that men for the passenger service were recruited mainly from the freight men and the yard men. For the passenger service this summer Regan had taken about 100 men out of the freight service. Regan had talked with Murray three times. He could not recall precisely what he had said; he could only give the substance of what he made it a rule to say in all such interviews. He had emphasized particularly the matter of protecting the train when working as rear flagman. He endeavored to impress on the men that they must do well so as not to be called into the office to be criticized. Murray had been called in twice, once in June and once in July, for minor infractions of the rules. Regan considered Murray a good man; otherwise he would never have transferred him to the passenger service. Asked if he had ever discharged flagmen for failing to flag he replied: "Very many; have discharged, suspended, disciplined and demerited."

Asked about the examiners, Regan said that O'Neil had been in the service 10 years and Jolson about eight. It did not appear that they had ever been either train despatchers or in the train service. Only one inexperienced man can be employed on a train; a man having less than six months' experience ought to be classed as inexperienced. New men generally go over the road for six or eight days on the local freight to learn the work and then they have to bring a written certificate from the conductor with whom they ride.

Clinton L. Bardo, general manager, gave testimony concerning discipline, supplementing Mr. Droege's statements. Mr. Bardo has been general manager since February 15, last, and prior to that was assistant general manager of the Lehigh Valley for about two years; before that he was for four years superintendent of the Grand Central Terminal, New York City. He started to give the records of the men connected with the trains in collision but was stopped and directed to hand this matter to the commission in writing, later. He gave a summary of cases of discipline for over-running signals since January 1, 1911. On the whole road there were 158 cases, of which 62 were on the Shore Line division (in which the New Haven-Springfield line is included). In connection with these 158 cases, 32 enginemen were discharged, 117 were disciplined by suspension or other means, and 9 cases were disposed of in some other way. In three of these cases the engineman was killed. In the same length of time 101 men had been disciplined for improper flagging, of which 38 cases were on the Shore Line division. Twenty-eight men were discharged and 73 were otherwise disciplined.

Mr. Bardo described briefly the organization of a division. Each division superintendent has a staff meeting every week, at which are present all the heads of departments, including the mechanical men. Discipline of any man is administered mainly by his immediate superior officer. The Brown system, somewhat modified, is in use; was inaugurated about 1905. Mr. Bardo seriously questioned whether this is just the right system for the service on this road; "but we have it and probably will have to get along with it." The superintendent knows at all times what the trainmasters are doing and where they are. Asked whether or not the signals on the line in question would be safer if each one had distant indication, Mr. Bardo replied, "Well, coupled with the rule that we have, I should say no."

Mr. Belnap: "In what way do you expect that a rule will neutralize the effect of the failure of men to obey?"

Mr. Bardo: "The engineman would disregard the rule if there were a distant signal, just the same as if there were no distant signal. We have such cases just the same where we have distant signals. The only thing involved here is the disregard of two very simple principles, (1) protect your train, (2) observe the rules."

At this point Commissioner McChord referred to the enclosed disk signal as obsolete, remarking that he understood that only 224 miles of road in this country now had such signals.*

Mr. Bardo said that "the system" was not the best in use to-

*The report of the Interstate Commerce Commission for January 1, 1913, shows 1,705 miles of road (3,615 miles of track) equipped with enclosed disk signals.—EDITOR.

day; but, coupled with the rule, it was as safe as any system, because, "it requires a man to observe only two things, namely, to protect his train, and, if he cannot see the signal, to stop."

Mr. Bardo, like Mr. Droege, had cautioned enginemen to be sure to make safety the first consideration, until the conditions could be improved. "If trains must be delayed why, we will take our medicine." Surprise tests had been made last year, but had been discontinued before Mr. Bardo came to the road; since then there have been so many other things to do that he has not restored those tests, although the matter has been discussed two or three times.

SECOND DAY'S HEARING.

The first witness on Friday was Frank T. Shanley, brakeman on 91. Shanley entered the service last May, before he was 21 years old. On stopping at signal 23 Shanley assured himself that Murray had gone back. When the collision occurred, Shanley was standing at the front end of the last sleeping car. Shanley's testimony seems to indicate that the rear of train 91 had passed signal 23 about two car lengths, but it is not very clear. He thought the train moved forward, before it was stopped by the conductor, only about five feet.

Questioned about his qualifications he said that there was a typewritten note, at the bottom of a page of his book of rules, to the effect that he was qualified to flag in case of emergency.

Shanley thought the stop at signal 83 was about two minutes. He did not know whether the flagman went back. He had no talk with Murray after the accident, except to say, in reply to a question, that he had heard the torpedoes. Shanley had shouted to Murray to jump out of the way of the approaching train. All he could say about Conductor Adams was that at the first stop he had seen Adams releasing the air brakes.

Engineman Miller was recalled on Friday and gave additional details. Signal 25 was clear, "and I gave the engine a little more steam to get to the top of the knoll opposite the gravel pit"; then he shut off and made a 5-lb. application of air; and when he saw the flagman he made another application of about 10 lbs.; and when he saw the signal and the tail end of the train he applied the brakes in emergency. Asked if the brakes took hold he replied, "They certainly did."

At this point Miller asked leave to amplify his statement of the previous day concerning his runs. He said: "It was not a very easy run to cover on account of my living here (near New Haven). A man can't live in three places and do one thing. On account of the job being where it was, I bid it rather than stand on the spare board. A man standing on the spare board will get a call to go [from New Haven] to Harlem River [68 miles] and when he gets to Harlem River he is cut out for eight hours, and then the chances are he is started for Northampton [144 miles], and when he gets to Northampton he is cut out [for the statutory rest period], and then he starts from Northampton to Harlem River again. Sometimes I was away from home for a whole week, living on the railroad track, and I was heartily sick of it, and I bid the first thing I could get. I had quite a number of small jobs and held them as long as I could until I was bumped by an older man. Then I took the White Mountain Express." He went on to give the hours, as we have shown them in another column. (His statement on the previous day to the effect that he has 12 hours off at Stamford seems to have been based on the assumption that he would reach Stamford two hours late, or, say, 9 a. m. instead of 7 a. m.)

On the morning of the collision Miller supposed that the other runner, who had been sick, would resume work, but he was not there, and so Miller said to the despatcher, "All right, I will have to cover it." Continuing, Miller said: "This last week, when I doubled, is what I referred to in my testimony of yesterday. I don't feel as though the company has anything against me; I don't think I have violated any rules; I don't think I have gone without sleep; I have had plenty of sleep and I have not had to take any whiskey to brace me up; that is something I have never done in my life. I make this explanation so you will not think that I have been running this way since July 1."

Mr. Bardo was again called to the stand, but the questions asked were largely repetitions of matters which had been covered in the examination of Mr. Droege, Mr. Wildin and Mr. Bardo the day before. The 100 trainmen who had to be taken from the freight service for the summer passenger trains, said Mr. Bardo, were necessarily those who had no regular freight runs, or men who had some desire to work on passenger trains. "The best we could do was to make the best selections possible, based on experience, general deportment, habits and personal characteristics." As to putting the best man at the rear of the train, there had been a tendency among the older men to want to get away from the rear end of the train, and it became necessary for the trainmaster to decide this question in each case, and not leave it to the conductor. The trainmaster or the crew despatcher must decide which of the two men shall be the rear end man.

Asked about the ability of eight trainmasters and assistant trainmasters to supervise 2,500 or 3,000 men, Mr. Bardo said that there was other supervision besides this; the large stations and terminals have agents and general yardmasters; the chief train despatchers and the train despatchers supervise trains to some extent, and there are also the road foremen of engines and the division engineers and supervisors of the roadway department.

The book of rules adopted July 1, 1907, made no important changes in old rules.

Mr. Bardo testified to taking action after the collisions at Stamford and elsewhere, similar to that testified to by Mr. Droege. The decision to install semaphore signals with home and distant indications on the New Haven-Springfield line was delayed somewhat by consultations held with the enginemen as to whether they preferred the left hand or the right hand quadrant. The enginemen were unanimous in their opposition to the center suspended signal and in favor of the upper left hand quadrant.

Asked if orders for steel passenger cars had been given and then rescinded, Bardo knew of no such thing. Mr. Bardo, like Mr. Wildin on the previous day, gave full details about the company's orders for steel cars and when they were to be delivered.

Complying with the request of Commissioner McChord, made the day before, Mr. Bardo presented the minutes of a meeting of the board of directors October 17, 1912, when the president of the road was instructed to leave nothing undone which, in the judgment of himself and his associates, would conduce to greater safety, no limitation being placed by the directors on the installation of signals, safety appliances or anything else that in the judgment of the president or his associates would improve the safety of passenger travel. At the same time it was voted that the policy of the company should be that all passenger equipment purchased in the future should be of the all-steel type. Following this Mr. Bardo gave a long list of items of expenditures for steel cars, for signals and for other safety features, since August, 1911, the total amounting to $6,926,050. A very small part of this expenditure was for replacements.

Supplementing his previous statements in relation to improvement in safety of operation, Mr. Bardo read a letter which he had issued to his subordinates June 5 last and another June 11. In these he called on the general superintendent and the mechanical superintendent to attend to these matters personally and see that the officers of each division should put this matter above everything else; and he called for weekly reports of the action taken on each division.

The number of men who have been interviewed within the last few months is over 8,000. Mr. Bardo presented a pamphlet containing the standard rules for examining men. Commissioner McChord wanted to know why conductors had not been held more strictly to the requirement that they should see that the rear flag-

man stayed on the rear car. Mr. Bardo replied: "We will do anything we possibly can do." Mr. McChord also wanted to know if passenger trains could not be scheduled farther apart, for if these trains on the fatal morning had been running 16 minutes apart instead of eight minutes the collision would not have occurred. Mr. Bardo would not admit this. It would be dangerous to try to combine the time interval with the space interval. Indeed, if 95 had been three minutes behind the engineman would have found signal 25 red, and the collision would not have occurred. Mr. Bardo submitted a copy of the circular which was issued previous to the heavy traffic of Labor Day, giving in detail the arrangements for all of the extra trains.

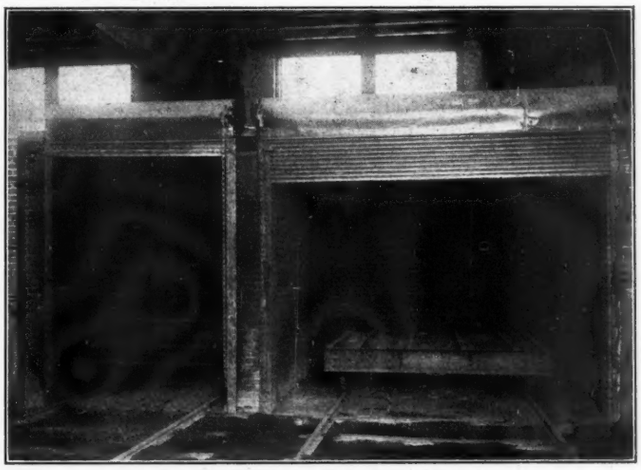
Richmond Dean, general manager of the Pullman Company, gave testimony concerning the construction of the sleeping cars which were in the wreck and also concerning the general policy of his company in the matter of building steel cars, with data concerning the number built, the number in service, etc. The Pullman Company had to transform its entire shop to a steel working plant instead of a wood plant and had to educate its men, a great task; but 38.4 per cent. of its active equipment is now made up of steel cars. No wooden cars are being built. The rear car in the wrecked train was built in 1908, the best style of wooden car at that time.

Mr. Wildin gave full details of the steel car equipment of the New Haven road, and C. H. Morrison, signal engineer, testified concerning signaling details.*

*The enclosed disk signal, No. 23, referred to in the foregoing account, is of the well known type, wooden case, painted white, with a wide black ring around the central opening through which the disk is displayed. A separate opening above the disk shows the light at night. The signal is about 20 ft. high and stands about 8 ft. from the nearest rail of the track. —Engineman Miller and Trainman Murray were held by the coroner on criminal charges and subsequently were released on bail bonds of $5.000 each. It was said that Miller's bond was furnished by the Brotherhood of Locomotive Engineers and that Murray's was furnished on the order of the railroad company.

COMBINATION BRASS, IRON AND STEEL FOUNDRY.

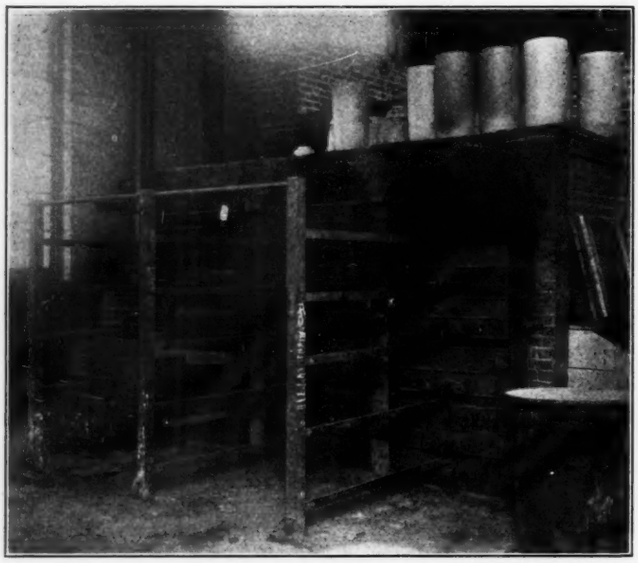
In connection with the new shops at Watervliet, N. Y., the Delaware & Hudson has installed a combination grey iron, brass and steel foundry. The making of even brass and iron castings by railroad companies is believed to be of doubtful economy by many, but in addition to these this foundry is turning out all the steel castings used in locomotive and car repairs except driving wheel centers and locomotive frames. The mechanical department officers of the road have been much pleased with



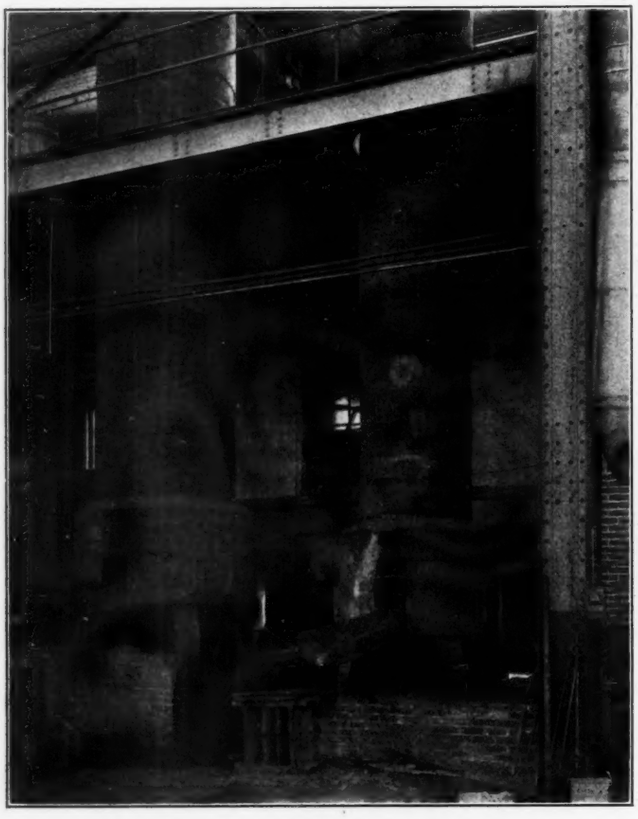
Drying and Core Ovens.

General Arrangement of the Interior of the Delaware & Hudson Foundry.

the results, particularly in the reduction of the time of delivery of castings. When a casting of any description is needed in a hurry it can be molded and delivered almost immediately, eliminating the delays attendant on ordering and shipping from outside sources. Excellent results have been obtained from the steel castings, including driving boxes, and with the means of making these castings so near at hand, it has been found convenient, in several cases where iron castings have proved of insufficient strength, to replace them at once with steel castings. This often saves delay in getting locomotives out of the shop and if the casting is unnecessarily heavy when cast steel is used it can be redesigned later.

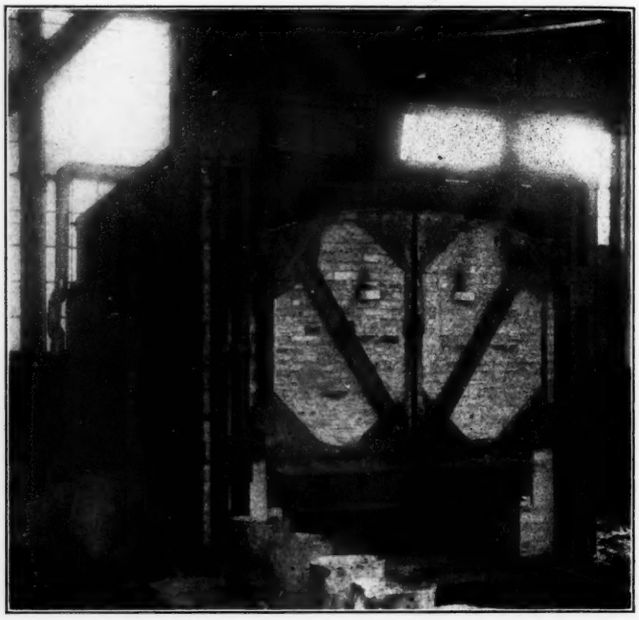


Battery of Drawer Type, Oil Fired Core Ovens.



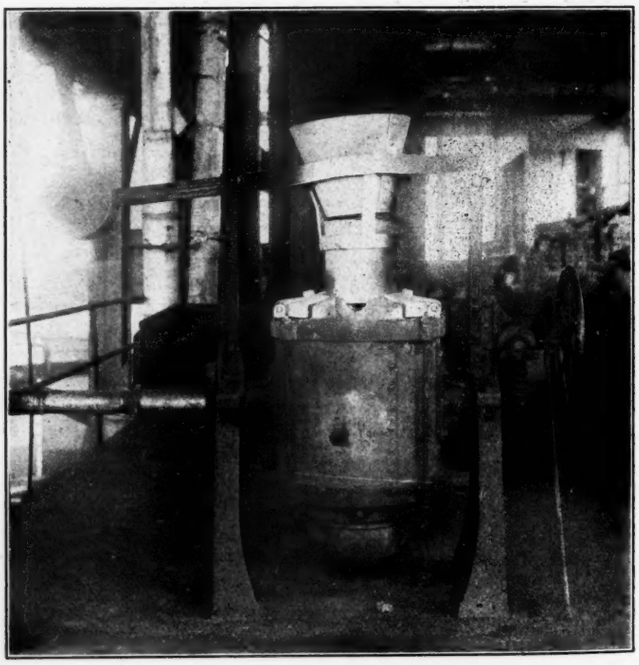
Arrangement of Cupolas in the Delaware & Hudson Foundry.

The main bay of the foundry is 57 ft. 4 in. x 176 ft., and is devoted to molding operations. The side bay is 30 ft. x 176 ft., and includes the cupola room, the core room and the cleaning room, and also provides space for the steel converter, sand grinder, sand storage, and annealing oven. The blowers are located on mezzanine floors, where toilet facilities are also provided.



Oil Burner Type Annealing Oven.

The equipment was furnished by the Whiting Foundry Equipment Company, Harvey, Ill. For the melting department (grey iron and steel) this includes a standard No. 5 Whiting cupola of from seven to nine tons capacity per hour, and a cinder mill; a No. 3 cupola is used for melting stock for the converter. The cupolas are provided with roofhoods, spark arresters, bottom door props, lighting torches and positive pressure blowers, with



Tilting Brass Furnace of 400 lbs. Capacity.

the necessary lining, blast piping and gates. A full equipment of ladles for both grey iron and steel is of course available and a casting breaker with steel framework, drop weight and electric hoisting machine, and an electric elevator of two tons capacity are also included.

In the steel foundry there is used a Whiting side-blow converter of two tons capacity, with the tipping mechanism operated by a motor; it is fitted with a Roots high pressure positive blower. There is also an oven 10 ft. x 13 ft. 6 in. for annealing steel castings, and a rotary sand grinder.

The coremaking department is provided with a car oven 7 ft. x 17 ft.; a drying oven for cylinder molds, 12 ft. x 17 ft., and a battery of drawer type ovens in three sections. An electric jib crane of four tons capacity is used for handling the cores. These ovens were installed complete with the brick work, flues

Side Blow Steel Converter of Two Tons Capacity.

and stack, and also the core and drying cars. The core and annealing ovens are oil fired, Ferguson burners being used. The cleaning department equipment consists of three exhaust tumblers 36 in. x 60 in., with piping, dust arrester and exhauster; there are the necessary chipping benches and grinders, the latter being connected with the exhaust system.

The brass foundry included a tilting brass furnace of 400 lbs. capacity, but this was found to be insufficient for the needs and it was moved to the erecting shop, where it is used for casting hub liners, a larger one being installed in its place. There are also installed a magnetic separator, a 24 in. x 30 in. wet tumbler, a metal band saw and the necessary benches and grinder. In the general equipment of the plant there is a complete system of industrial tracks and turntables, as well as charging cars for pig iron and coke.

The foundry is under the direct supervision of J. H. Manning, superintendent of motive power, and G. S. Edmonds, superintendent of shops, Delaware & Hudson Company. V. Z. Caracristi was consulting engineer for the railway company in charge of the construction.

General News.

The shops of the New York, Chicago & St. Louis, at Stony Island avenue and Ninety-first street, Chicago, were destroyed by fire on Wednesday last; loss, $500,000. Seven hundred men are temporarily thrown out of employment.

On the Hannibal division of the Chicago, Burlington & Quincy between St. Louis and Burlington, Ia., train orders are now sent by telephone, following the completion of the telephone circuit between Hannibal and Burlington, about 100 miles.

The Department of Agriculture says that the government's forest rangers are using gasolene railway speeders for fire protection purposes. They follow up trains on steep grades where sparks thrown out by the locomotives are likely to start fires along the right of way.

The Chicago, Milwaukee & St. Paul, the Chicago, St. Paul, Minneapolis & Omaha, the Chicago & North Western, and the Illinois Central have notified the Wisconsin Industrial Commission of their determination not to come under the state workmen's compensation law.

The state attorney at Bridgeport, Conn., announces that he is going to ask for a special session of the Superior Court in the month of October, to try Messrs. Mellen and McHenry, former officers of the New Haven road, on charges of manslaughter in connection with the wreck at Westport last year.

The Canadian Pacific has fitted up a car for giving instruction in first aid to the injured. The car, with an instructor, has been started out on a complete tour of the system, from New Brunswick to the West. It will remain at each grand divisional point for about three weeks, and at the smaller ones for about ten days.

Incorporation papers have been taken out in Illinois for the Federation of Pullman Conductors of America and the Federation of Pullman Porters of America. Headquarters of both organizations will be in Chicago, and it is understood that after sufficient membership has been obtained efforts will be made to obtain increases in wages.

Arbitration of the demands of engineers and firemen on the Chicago & Western Indiana and the Belt Railway of Chicago for increases in pay and other schedule changes was begun at Chicago last week before Judge E. S. Huston, of Washington, D. C., F. A. Burgess, representing the employees, and W. J. Jackson, president of the Chicago & Eastern Illinois, representing the railways.

Of the 37 employees of the Pennsylvania Railroad Lines east and west of Pittsburgh who were put on the pension rolls on August 1, five had served 50 years or more; and a leaflet has been issued by the road containing sketches and portraits of these five men. They are J. M. Daugherty, boilermaker, J. G. Trout, engine preparer, E. Toy, conductor, John Quinn, car builder, and H. J. Amerling, tinner.

Senator O'Gorman of New York, has introduced in Congress a bill designed to prohibit the use of wooden cars in passenger trains after a certain date in the future. The senator would make it unlawful to introduce any new wooden cars after the end of this year; and at the same time he would extend to the whole train the present rule concerning mail cars, which forbids running wooden cars between those of steel.

The Kansas City Southern has appointed a valuation committee, to facilitate the preparation of the necessary data and the consideration of the problems involved in the valuation to be made by the Interstate Commerce Commission. The Committee consists of R. J. McCarty, vice-president, chairman; C. E. Johnston, chief engineer; S. W. Moore, general solicitor; G. F. Hess, superintendent of machinery, and A. F. Rust, valuation engineer.

Coroner Hoffman, of Cook county, Illinois, has invited 24 prominent citizens of Chicago to become members of a Safety First committee to seek remedies for the causes of automobile accidents, and to inaugurate a safety campaign. Several of those invited are in charge of safety work for corporations, and the

list includes two railway men, W. A. Garrett, vice-president of the Chicago Great Western, and R. H. Aishton, vice-president of the Chicago & North Western.

The House of Representatives, in its discussion this week of the urgent deficiency bill, again showed its determination to abolish the commerce court; and on Tuesday it went farther, and by a vote of 181 to 78, adopted an amendment, proposed by Mr. Bartlett, of Georgia, repealing the law under which the five judges were appointed, the intent of this amendment being to throw the present judges of the court out of office entirely, instead of leaving them in their present status as judges of the circuit courts.

Imprisonment for Sleeping on Duty.

At Lynbrook, N. Y., this week, Frank J. Berbitz, a railroad crossing flagman, was sentenced by Justice Neu to sixty days in the Nassau county jail for having fallen asleep at his post. He was flagman at the crossing of the Long Island road when two men in an automobile were killed recently. Two weeks ago, between 8 and 9 o'clock at night, a train came along and it was discovered that no one was on duty at the crossing. The train was stopped and Berbitz was found asleep in the flagman's shanty.

Half a Million Meals.

Some idea of the magnitude of the operations of the sleeping and dining car department of the Canadian Pacific is furnished by the fact that 4,000 men are employed, and within five or six days could transport an army of 30,000 people from Vancouver to Halifax, giving each person a berth in which to sleep and supply 90,000 meals a day, or practically half a million on the journey of 5½ days across the continent. The company's sleeping and dining cars would make a train 14 miles long.—*Canadian Pacific Bulletin.*

Record of a Pennsylvania Atlantic Type Locomotive.

On the night of August 15, 1913, Pennsylvania Railroad, class E-6a (Atlantic type) locomotive 1067 received train No. 19 at Manhattan Transfer, ½ min. late. This train is due to leave New York at 8:34 p. m., Manhattan Transfer at 8:52, North Philadelphia at 10:36; and to arrive at Broad street, Philadelphia, at 10:40 p. m. It left Newark three minutes late, on account of a very long stop, passed Perth Amboy 4½ min. late, due to the speed limit through Rahway, making the run from Perth Amboy Junction to Metuchen, 5.8 miles, in 7½ min., which is exceptionally good, considering the slow movement through Rahway. Between New Brunswick and Frankford Junction, 7 min. were made up, so that the train passed the latter point only ½ min. late, but 7 min. were lost from Frankford Junction to North Philadelphia, due to signals on account of train 155 being ahead. The train arrived at Broad street station 6 min. late, but would have gone in on time had it not been for the train ahead between Frankford Junction and North Philadelphia. The train consisted of ten steel Pullman sleeping cars, one combination passenger and baggage car, one coach and one postal car, the total weight being about 984 tons. No trouble was experienced in starting the train at Manhattan Transfer, Newark and North Philadelphia. The locomotive weighs approximately 235,000 lbs. The distance from Manhattan Transfer to Broad street station is 82.9 miles.

The Congressional Method.

Following considerable discussion of the recent collision at North Haven, Conn., and the advisability of passing laws to require the use of steel cars in passenger trains everywhere, the lower House of Congress, on Saturday last, adopted an amendment to the urgent deficiency bill, directing the Interstate Commerce Commission to investigate block signal systems and other safety devices, and granting for that purpose a special appropriation of $25,000. Commenting on this, the *Evening Post,* New York, says:

The House of Representatives on Saturday gave an admirable illustration of foolish legislation by voting to appropriate $25,000 for an investigation. . . . To the public at large this doubtless smacks of praiseworthy public spirit, following the latest New Haven wreck. The truth is, however, that such an appropriation would be an indefensible waste of public funds, for the reason that precisely this information has already been acquired at an expense of $100,000. The Interstate Commerce Commission made a comprehensive report, which was printed February 23, 1907, as Senate Document No. 342. Later a "Block Signal and Train Control Board" was formed, which temporary body, composed of five experts, made no less than five exhaustive reports, covering all the questions involved and bringing them up to date. Any fresh investigation would merely cover the same ground.

The Interstate Commerce Commission, as a result, recommended—as it previously had—a law making block signaling compulsory. But Congress did nothing at all. Its members were "too busy" to read the reports, and probably many new members do not know that they exist. What Congress ought to do is to reconsider its action of Saturday, and, after study of what has already been presented to them, decide whether or not any Congressional action should be taken. Any other course will be an inexcusable waste of time and money.

A "Safety First" Swimming Pool on the Frisco.

The accompanying photograph illustrates a unique method of promoting "safety first" which has been adopted by C. H. Baltzell, superintendent of the Ozark division of the St. Louis & San Francisco at Thayer, Mo., as mentioned in the *Railway Age Gazette* of August 1, page 201. This is one of the methods which resulted in the Ozark division winning the "safety first" honors on that road last year by reducing the number of personal injury accidents 63 per cent.

Mr. Baltzell was formerly a physical culture teacher, and is a powerful athlete. When he took charge of the Ozark division he found that many boys in that community were in the habit of "hopping" trains. Police regulations and force had no effect upon the situation, but finally Mr. Baltzell hit upon the idea of the swimming pool. A platform, steps and swing board with

Frisco "Safety First" Swimming Pool.

a dressing room were installed at the old swimming hole in Warm Fork opposite the superintendent's office, after which Mr. Baltzell called the boys together and told them that the pool was at their disposal, and that he would teach them how to swim and other athletic "stunts" if they would stop "hopping" trains, and that any boy who was caught "hopping" the trains would be barred from the pool. Mr. Baltzell takes occasion frequently to talk briefly to the boys upon the dangers of playing about the trains, and as a result there are practically no accidents in Thayer, and the boys not only do not hop trains, but keep out of the yards. During eleven months of the last fiscal year there was not a boy injured on the Ozark division.

Last Stages of Panama Canal Work.

Press despatches of September 7 report that the dry excavation of the Panama canal has been completed, the steam shovel working in the Culebra cut having removed the last rock on the 6th. Further excavation of the canal will be completed by dredging. The present result has been accomplished ten days ahead of schedule time. An army of men will be

busy during the next four weeks removing steam shovels and other equipment and material, including 36 miles of railroad track, from the nine-mile channel in Culebra cut, between Gamboa dike and Pedro Miguel locks. This is preparatory to turning water into the channel from Gatun Lake, on the Atlantic side, on October 5, five days in advance of the date set for the dynamiting of Gamboa dike. The water will be introduced through four 26-in. pipes extending underneath the dike; and although the five-day period hardly will suffice to fill the channel to one-third the canal level, enough will be let into act as a cushion against the explosion when the dike is destroyed.

While the cut is being cleared of railway and equipment, drilling and blasting will be going on at the bottom of the channel, loosening rock and earth for the dredges that soon will be set to work. On August 1, 998,000 cu. yds. remained to be taken out of the "theoretical canal prism," and since that time the steam shovels have reduced the amount to approximately 650,000 cu. yds., which is left for the dredges. Six of the shovels will be retained for the work of removing material from the east and west banks near Culebra to lessen the danger from slides.

The destruction of Gamboa dike will leave only one such obstruction along the canal route—the dike over which the railroad crosses at Gatun locks, and which can be removed at any time. The last barrier on the Pacific side, the Miraflores dike, has been broken up, turning Pacific tide water into a channel 5,000 ft. long, 500 ft. wide and 41 ft. deep.

Dredges are now navigating this channel, and small vessels probably will be able to pass through the canal from end to end by October 10.

Some of the Stuff the Dailies Printed About the Wreck.

The White Mountain express, with a superheated locomotive and eight steel cars.—New York *American,* September 3.

Miller worked night and day for an entire week.—New York *American,* September 4.

Connecticut state officials helped New Haven railroad in plot of secrecy.—New York *American,* September 4.

The old semaphore signals are still in use on this stretch of road.—Editorial from New York *Times,* September 3.

Dividends of death! Its out-of-date wooden car equipment, its treacherous signal system that allows two trains to be on the same track within a few yards of each other. . . .—New York *World,* September 3.

Engineman wept; knew road would put blame on him.—New York *World,* September 3.

"Overwork did it," says engineman's foster mother.—New York *World,* September 3.

Murder as an adjunct to monopoly.—New York *Evening Journal,* September 3.

The locomotive which did the frightful damage was of the 1300 type, similar to that which caused the loss of life in Stamford. Its number is 1337 and it is a superheated Mogul model.—New York *Evening Journal,* September 2.

The third pasteboard sleeper, the Chisholm, was hauled from the ditch by two giant cranes and started back to the New Haven repair yard. The reason assigned by one of the men for not burning the badly battered car was unique. "You see, it isn't badly damaged," he said. "It can be patched up and put in service again."—New York *Globe,* September 3.

That the tired out engineer, running through the fog at from 40 to 60 miles an hour, shot by signals, as declared by the railroad officials, is emphatically denied by Mrs. Scott.—New York *Globe,* September 3.

"Slept only two hours a day for a week," says his boarding house keeper.—New York *Globe,* September 3.

The railroad system of signals is shown to be in a state of chaos. . . . If trains must be held up at stations, hold them up until all is clear to the next station, no matter what the delay may be.—Editorial, New York *Mail,* September 3.

An inspection of the semaphore signal north of the wreck showed that it was still at danger. Engineer Miller says in an interview: "It was so thick I did not see any banjo signal set against me, and I did all I could to stop the train. I set all the brakes and then jumped."—New York *Mail,* September 2.

Mr. Elliott's Outline of the New Haven Plans.

After the hearing before Interstate Commerce Commissioner McChord which is reported at length elsewhere in this issue, President Elliott spoke to newspaper men about his plans for the immediate future of the New Haven. He said that one of the first steps will be to divide the present Shore Line Division into two divisions; thus giving two division organizations to do the work of supervision now being carried on by one superintendent and his staff.

The work on the installation of new semaphore signals, between New Haven and Springfield, with home and distant indications, which was begun several weeks ago, will be hastened.

Present plans, President Elliott says, provide for a substitution of steel for all of the wooden sleeping and parlor cars by January 1, 1914. Of course, this plan is dependent on the ability of the Pullman Company to furnish steel cars within this time; and in addition to the pressure being brought to bear on the Pullman Company, rush orders have been sent to other car builders calling for the building of steel coaches, etc., for the New Haven itself. The total expenditure on this account will be in the neighborhood of $6,500,000.

On Tuesday, President Elliott and Mr. Rea, of the Pennsylvania, who is a director of the New Haven, appeared before the Massachusetts Railroad Commission, asking approval of the proposed issue of $67,500,000 debentures. During the course of this hearing Mr. Elliott said: "There are $46,000,000 of debts to be paid. The company has contracted for approximately $7,000,000 of the most modern type of equipment that will make for safety of the traveling public. We have further contracted over four years for equipment of like character of nearly $7,000,000 more. The bulk of this expenditure is for steel cars to put on passenger trains. In addition there are betterments of general character amounting to something like $12,000,000. These sums, with the lawful debts to be paid, amount to between $65,000,000 and $66,000,000. To keep this great tool of commerce in a safe condition will take more money. Every day something comes up. . . . These daily expenditures for capital account run into considerable amounts; $10,000,000 or $15,000,000 a year is not too low for this company.

Newspapers' Comments on the New Haven.

"Congress stirred by wreck," runs a headline. If Congress stirred a little between wrecks it would be better for legislation. The public may forget quickly, but one expects more of statesmen.—Springfield *Republican.*

It was the rear coaches of the forward train that suffered in both cases, and in the English accident the wreckage caught fire. That similar accidents occurred on two widely separated roads on the same morning cannot be put out by either as an excuse or apology; but it shows that the "New Haven" is not the only road that is not exempt from such sad calamities.—Hartford *Courant.*

The unanimity with which the newspapers condemn the system of operation on the New Haven lines for the awful wreck of Tuesday follows a hesitant, but enforced, change of heart on the part of many editors who have in the past steadfastly refused to succumb to public hysteria or to let their sense of horror overcome their sober judgment. But the change had to come. The conclusion is almost unescapable that something in the fundamentals of management must be wrong.—Hartford *Times.*

We take it that the bankers of New York and those of Boston have reached a working agreement as to the division of the financial spoils. It looks so on the surface of things. Boston's pride has been mollified by the decision of Mr. Elliott to eventually make his home there. Well, Connecticut will not worry about that, but it will begin to pick up its ears mighty fast if the proposal is seriously made to eliminate from the official title of the company the words New Haven. This town is the legal headquarters of the company. . . . There is no reason worthy of recognition why "New Haven" should be jauntily eliminated to suit the wounded vanity of Boston. So with the persistent rumor that the next Legislature will be asked to repeal the provision requiring a majority of the directors to be residents of Connecticut.—New Haven *Journal-Courier.*

The New Haven wreck carries one compelling lesson to every railroad in the United States. There must be a speedy replacement of wooden cars with all-steel cars. In a recent Pennsyl-

vania wreck exactly similar to that on the New Haven more than 150 persons were only slightly injured, and not a single passenger suffered a broken bone; but the cars were solid steel.—Philadelphia *Public Ledger*.

Whether on the unfortunate New England lines or on any other railroad, a rear-end collision is inexplicable and indefensible on any theory of train operation that includes reasonable discipline and intelligent regulations. No assumed public demand for speed and no clerical record of train arrivals can excuse or condone a rear-end collision. On the subject of wooden coaches, let it be remembered that the vast majority of passengers ride safely and comfortably in such vehicles daily, without thought of danger. The composition of cars is of importance, but it is emphatically of less interest than the management of trains.—New York *Sun*.

Can anybody in New Haven or Connecticut regard the so-called investigation of the causes of the North Haven wreck by the Interstate Commerce Commission as anything more than a farce? After flamboyant demands from Washington and promises of a vigorous, thorough and impartial investigation, a hearing lasting less than two days was held, and that hearing devoted largely to club cars between Stamford and New York and the signal equipment on distant parts of the New Haven system. There was no attempt to investigate any of the 158 cases of running by signals nor the reasons therefor. No attempt to subpœna those who might tell of similar cases of lack of discipline or unavoidable mistakes where terrible loss of life might have occurred, but did not. Why not? Why was there not a comprehensive effort made to get at the conditions that have resulted in all this criminal carelessness? Did the Interstate Commerce delegation that came here want to get at real causes? Or did they want to indulge in a little vague criticism of the New Haven management and play to the gallery? They came on and lived comfortably, even luxuriously, at the Taft Hotel, with a force of clerks and stenographers, and occupied eight or nine rooms. It must have been a very pleasant junket, costing the federal government and the taxpayers a good round sum of money.—New Haven *Register*.

American Association of Passenger Agents.

The annual convention of the American Association of Passenger Agents was held at St. Paul, Minn., on September 8-9. Approximately 200 members of the association left the Chicago terminal of the Chicago & North Western on Saturday, September 6, after an inspection of the terminal, and another party of members joined them at Madison, Wis. The two principal subjects for discussion at the convention were "The Field Man," and "How to Increase Our Efficiency to the Public and Our Employers." At the close of the convention the members were taken on a trip through Yellowstone National Park as guests of the Northern Pacific by a special train to Gardiner, Mont., and thence by stage.

Officers of this association were elected as follows: President, R. T. G. Matthews, assistant general passenger agent, Missouri Pacific, Kansas City, Mo.; vice-president, M. F. Bragg, Norfolk, Va.; secretary-treasurer, E. T. Monett, general western passenger agent, New York, Ontario & Western, re-elected.

It was decided to change the name of the association to the American Association of Traveling Passenger Agents.

American Society of Mechanical Engineers.

The date of the railway session of the fall meeting of the American Society of Mechanical Engineers has tentatively been arranged for the afternoon of December 3. The topic for discussion will be Steel and Steel Underframe Box Cars. As the result of replies to a circular letter it has been decided to restrict the scope of the papers to secure more detailed discussion. W. F. Keisel, Jr., assistant engineer, Pennsylvania Railroad, has been asked to prepare a paper on All Steel Box Cars; and R. W. Burnett, M. C. B., Canadian Pacific, on Steel Underframe Box Cars. E. O. Chenoweth (Rock Island Lines), R. B. Kendig (New York Central Lines), and B. D. Lockwood, chief engineer, Pressed Steel Car Company, Pittsburgh, Pa., have been asked to prepare written discussions on the former paper; and G. W. Rink (C. of N. J.), O. C. Cromwell (B. & O), and A. Christiansen, chief engineer, Standard Steel Car Company, Pittsburgh, Pa., have been asked to prepare written discussions on the latter.

Master Painters' Association.

The forty-fourth annual convention of the Master Car & Locomotive Painters' Association was held at the Chateau Laurier, Ottawa, Canada, September 9 to 12, President A. J. Bush, master painter, Delaware & Hudson, Oneonta, N. Y., presiding. Rev. W. A. McIlroy, of the Stewarton Presbyterian Church, offered the opening prayer. The association was welcomed to the city by Mayor J. A. Ellis, who is also a member of the provincial parliament of Ontario, and Dr. R. H. Parent, one of the four comptrollers. The addresses of welcome were responded to by C. A. Copp, master painter of the Boston & Maine. A report of the proceedings will be included in the issue of next week.

Roadmasters' Convention.

The thirty-first annual convention of the Roadmasters' and Maintenance of Way Association was held in the Auditorium hotel, Chicago, September 9-12. The opening session Tuesday morning was called to order at 11 o'clock, by President William Shea. Over 200 roadmasters were in attendance, and about 50 manufacturers of track materials and devices had exhibits in the corridors of the hotel, making the convention fully up to the standard of previous years, both in point of attendance and importance of exhibit. A complete report of the convention will be published in the "Maintenance of Way Section" next week.

Efficiency Society.

The first fall meeting of the Efficiency Society will be held at the Lake Placid Club, Essex county, N. Y., in the Adirondack mountains, September 19-21. The meeting will consist of a series of conferences on efficiency in non-profit making institutions, such as the church, hospital, charity, philanthropic and civic organizations, the government, federal, state, county municipal, etc.

Signal Appliance Association.

The annual meeting of the Signal Appliance Association will be held at the Hermitage Hotel, Nashville, Tenn., October 14-17, in connection with the annual convention of the Railway Signal Association. An attractive program of entertainment has been arranged by the secretary of the Appliance association.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May, 1914.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass. Convention, May 19, 1914, St. Louis.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York. Annual meeting, October 14-15, Philadelphia, Pa.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Next convention, October 13-17, Atlantic City, N. J.

American Electric Railway Manufacturers' Assoc.—H. G. McConnaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next meeting, November 19, 1913, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, October 21-24, 1913, Montreal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—A. R. Davis, Central of Georgia, Macon, Ga.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wenlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, 1914, St. Paul, Minn.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Annual convention, October 18-24, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 20-23, New Orleans, La.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Next meeting, December 9-10, Galveston, Tex.

ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y. Annual meeting, October 8, Philadelphia, Pa.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, May 20-22, Galveston, Tex.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago. Annual convention, May 18-22, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.

MAINTENANCE OF WAY & MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NATIONAL RAILWAY APPLIANCE ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3rd Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria; 2d Thursday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York. Annual dinner, second week in December, 1913, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Mobile & Ohio, Mobile, Ala. Next meeting, October 7, Chicago.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Convention, October 14, Nashville, Tenn.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago. Annual meeting, September 23-25, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.

UTAH SOCIETY OF ENGINEERS.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Western Passenger Association, at a meeting on September 4, declined to grant rates lower than two cents a mile for a number of conventions to be held in St. Louis in October.

Commissioner John H. Marble, of the Interstate Commerce Commission, was the guest of the Transportation Club of San Francisco, at a luncheon on September 5, and gave an informal address.

The Pennsylvania Railroad has made an arrangement with Thomas Cook & Sons, the tourist agents, whereby the lines of the Pennsylvania System will be represented by Messrs. Cook at their offices in all parts of the world.

It is announced that the Trunk Line and Central Traffic Association roads will probably file their new tariffs, increasing rates about five per cent., on or about October 15. Reports of railroad revenues during the past few months, disproving predictions that there would be large increases, are expected to afford good support of the claims of the roads that increased rates are necessary.

The Chicago, Burlington & Quincy, in co-operation with the Iowa State Agricultural college, will shortly operate a special apple demonstration train through the rural districts of Iowa. Lectures will be given on apple picking, packing, storage and marketing, and demonstrations will be given with various special apparatus for this purpose. It is estimated that the state of Iowa will produce about 5½ million bushels of apples this year.

The special committee appointed by the Public Service Commission of West Virginia to see to the redeeming of the coupons which have been issued by the Chesapeake & Ohio to passengers who paid at the higher rates while the courts were considering the suit of the company to annul the law reducing rates, is said to have received already 60 bushels of coupons. The value of these coupons ranges from one cent to $3. An officer of the road estimates that the aggregate amount to be refunded is several hundred thousand dollars.

The freight and transportation department of the New Orleans Board of Trade has issued a circular to its members stating that the volume of traffic which will be offered to carriers during the coming fall and winter will tax to the utmost their transportation facilities, and with a view to co-operating with the carriers, and assisting them in the prompt movement of cars, all shippers are urgently requested to load cars as near their carrying capacity as commercial conditions will permit, and particularly to make all possible effort to promptly release cars.

General Crop Conditions.

The Department of Agriculture estimates crop conditions to be as follows:

	For the United States. Condition, Sept. 1.				Acreage, 1913.	
Crops.	1913.	1912.	Ten-yr. av.	Aug. 1, 1913.	P. Ct. of 1912.	Acres.
Corn	65.1	82.1	80.9	75.8	99.8	106,884,000
Winter wheat	....	....	....	....	116.4	30,938,000
Spring wheat	*75.3	*90.8	*76.9	74.1	97.0	18,663,000
Oats	*74.0	*92.3	*79.3	73.7	101.1	38,341,000
Barley	*73.4	*88.9	*81.1	74.9	96.3	7,255,000
Rye	....	....	....	....	100.8	2,134,000
Buckwheat	75.4	91.6	87.0	85.5	100.0	841,000
White potatoes	69.9	87.2	79.4	78.0	99.3	3,685,000
Tobacco	74.5	81.1	81.5	78.3	93.4	1,144,500
Flax	74.9	86.3	80.9	77.4	85.1	2,425,000
Rice	88.0	88.8	89.2	88.7	114.0	824,100
Hay, all tame	....	....	....	81.8	97.5	48,293,000
Apples	47.7	67.9	54.4	52.2	....	.....

*Condition at time of harvest.

Market experts now calculate that the total corn crop will be about 2,350,000,000 bushels.

Passenger Fares in Alabama.

In regard to the recent court action in Alabama concerning passenger fares a correspondent writes as follows:

"In 1907 the legislature established a standard passenger fare in Alabama for roads operating 100 miles or more within the state, of 2½ cents per mile. All of the trunk lines within the state sued out injunctions against this passenger rate in conjunction with a certain schedule of freight rates on what was known as the 110 commodities, established also by the legislature. Sub-

sequent to the securing of the temporary injunction, these roads asking for said injunction agreed to put this passenger rate in effect with some modifications allowed in the freight schedule, with the exception of the Louisville & Nashville, the Central of Georgia, the Western of Alabama, the South & North Alabama, a subsidiary of the Louisville & Nashville, and the Nashville, Chattanooga & St. Louis. These roads have secured a permanent injunction in the U. S. District Court against this legislative enactment, both freight and passenger.

"About one year ago, the Railroad Commission of Alabama, of its own initiative, cited these contesting lines of railway to appear before it, and show cause why the commission, after investigation, should not establish a just and reasonable passenger rate, it being the opinion of the commission, without hearing the evidence, that a 3-cent rate, then used, was probably an unreasonable rate. After taking evidence, the commission issued an order to all of these roads requiring them to adopt a passenger rate that the commission established, 2½ cents a mile, except that the commission has not yet finished hearing the Nashville, Chattanooga & St. Louis case.

"The Louisville & Nashville asked for a restraining order against the commission's order, which said restraining order has been refused, and the 2½ cent passenger rate is now in effect on the L. & N. The other roads have also asked for a restraining order, and the court has not yet determined whether or not said restraining order will be granted. Presumably, this will be settled this week."

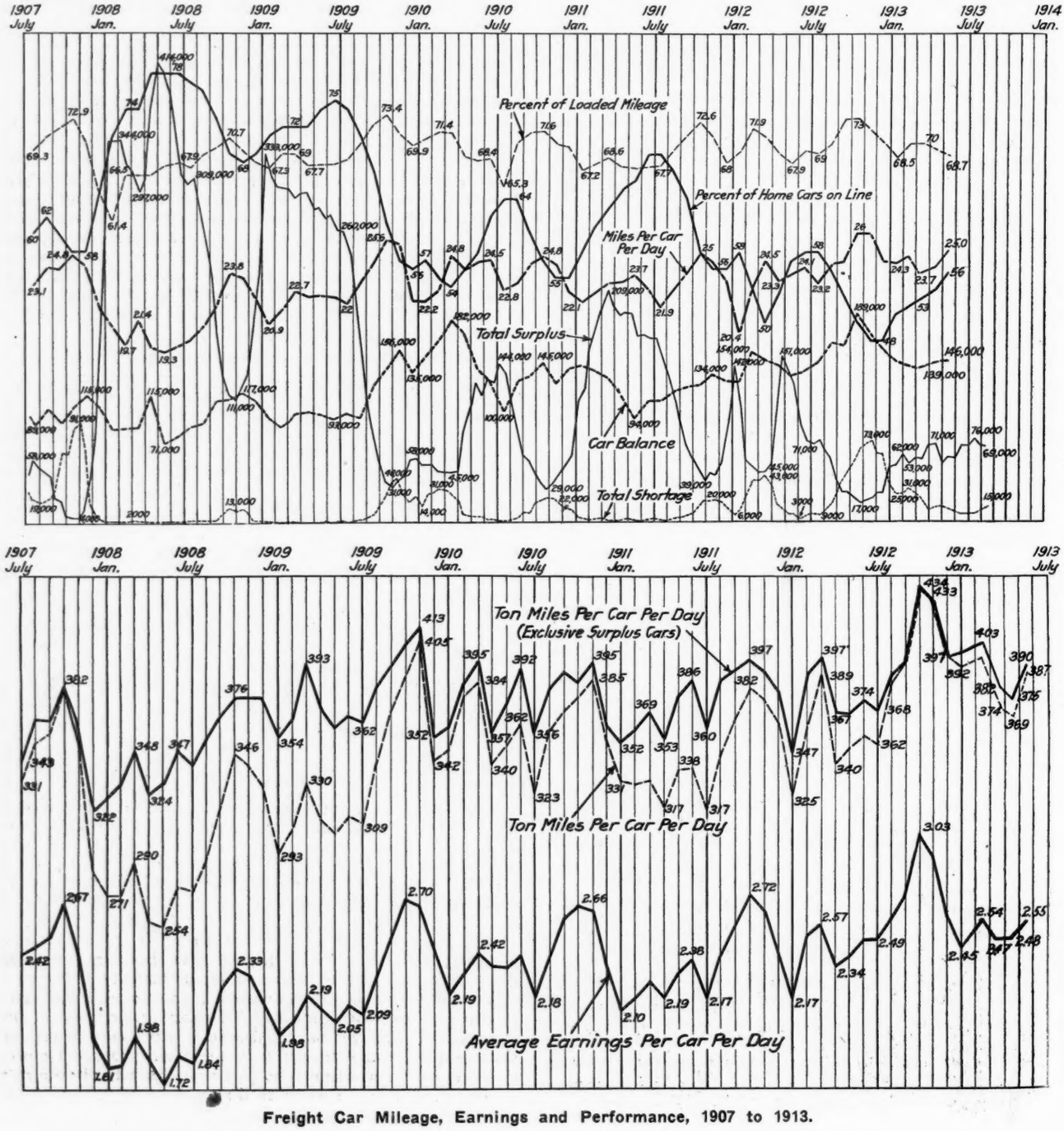
Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 152, covering car balances and performances for May, says:

The miles per car per day for May were 25.0 compared with 24.0 in April. This figure for May, 1912, was 23.7.

Ton miles per car per day for May were 387, compared with 369 in April. This is an increase of 10.57 per cent. over the figure for May, 1912, which was 350.

The proportion of home cars on line increased two points



Freight Car Mileage, Earnings and Performance, 1907 to 1913.

CAR BALANCE AND PERFORMANCE IN MAY, 1913.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	89,800	689,801	219,454	188,887	171,421	429,049	18,061	133,490	31,364	136,553	136,672	2,244,552
Average number of system cars on line	43,091	361,026	123,865	100,711	80,500	290,659	5,980	69,498	19,144	73,836	91,138	1,259,448
Railway-owned cars: Average foreign on line	52,582	325,258	124,955	78,793	78,439	144,059	8,922	56,588	21,886	42,857	44,651	978,990
Total Railway-owned cars on line	95,673	686,284	248,820	179,504	158,939	434,718	14,902	126,086	41,030	116,693	135,789	2,238,438
Excess	5,873	*3,517	29,366	*9,383	*12,482	5,669	*3,159	*7,404	9,666	*19,860	*883	*6,114
Per cent. of cars on line to total owned:												
Home	48	52	56	53	47	68	33	52	61	54	67	56
Foreign	59	47	57	42	46	33	50	38	70	31	32	44
All railways	107	99	113	95	93	101	83	90	131	85	99	100
Private cars on line	3,732	36,112	11,557	5,215	10,673	14,977	1,922	7,841	4,311	9,829	2,659	108,828
Total, all cars on line	99,405	722,396	260,377	184,719	169,612	449,695	16,824	133,927	45,341	126,522	138,448	2,347,266
Per cent. of cars in shop	7.39	6.02	8.68	7.51	10.27	5.70	7.39	7.81	6.71	6.53	4.37	6.85
No. of freight engines owned	1,442	10,442	3,171	3,453	2,896	6,966	511	2,737	913	2,809	2,268	37,608
Average cars on line per freight engine owned	69	69	82	53	59	65	33	49	50	45	61	62
Total freight-car mileage	60,527,120	555,482,214	174,439,528	150,342,959	145,450,907	325,235,713	24,638,749	95,745,241	40,099,982	123,188,977	115,680,398	1,810,831,788
Average mileage per car per day	19.6	24.8	21.3	26.3	27.7	23.2	48.7	24.3	28.5	31.4	27.0	25.0
Per cent. loaded mileage	73.0	67.0	69.2	65.7	69.7	70.3	74.5	68.9	63.9	68.6	73.3	68.7
Ton-miles of freight, including company freight	709,417,109	9,293,567,882	3,109,193,071	2,383,587,079	2,039,283,003	3,604,693,201	405,039,383	1,354,035,605	474,496,305	1,721,341,704	1,666,956,043	26,761,610,385
Average ton-miles, including company freight:												
Per car-mile	11.7	16.7	18.4	15.9	14.0	14.5	16.8	14.1	11.8	14.2	14.4	15.5
Per loaded car-mile	16.1	25.0	26.6	24.1	20.1	20.7	22.6	20.5	18.5	20.8	19.6	22.6
Per car per day	230	415	393	416	389	336	820	344	338	446	388	387
Gross freight earnings	$7,608,707	$53,582,554	$16,584,031	$13,535,549	$13,336,538	$33,978,804	$2,851,909	$11,222,879	$3,910,109	$17,467,730	$11,232,534	$185,311,344
Average daily earnings: Per car owned	$2.73	$2.50	$2.44	$2.31	$2.51	$2.55	$5.09	$2.62	$4.02	$4.14	$2.65	$2.66
Per railroad car on line	2.57	2.52	2.15	2.43	2.71	2.52	6.17	2.92	3.07	4.85	2.67	2.67
All cars on line	2.47	2.40	2.05	2.36	2.54	2.44	5.47	2.75	2.78	4.48	2.62	2.55

*Denotes deficiency.

to 56 per cent. in May, 1913, compared with 57 per cent. in May, 1912.

The per cent. of loaded car mileage for May, 1913, was 68.7 per cent., compared with 69.4 per cent. in April. This figure for May, 1912, was 67.9 per cent.

The average earnings per car per day for all cars on line for May were $2.55, compared with $2.48 in April. This is an increase of 6.69 per cent. over the earnings for May, 1912, which were $2.39.

The accompanying table gives the car balance and performance in the month covered by the report, and the diagrams show car earnings and car mileage and different car performance figures monthly from July, 1907.

INTERSTATE COMMERCE COMMISSION.

Commissioner Prouty held a hearing at Chicago on September 8 on a complaint filed by the Springfield Commercial Association asking a reduction in rates from the East from a basis of 117 per cent. of the New York to Chicago rate to 110 per cent., which is the Peoria basis.

Commissioner Prouty began a hearing at Chicago on September 9 on a complaint filed by fifteen lumber mills in the vicinity of Little Rock, Ark., attacking the present system of rates on yellow pine lumber under which blanket rates are made to northern points from the group extending from Little Rock to the Gulf of Mexico west of the Mississippi. The complainants allege they are discriminated against to the extent of 2 to 4 cents per 100 lbs. as compared with rates from points east of the river, and ask that the group be divided on the Arkansas-Louisiana line. The rates to the gateways are now: Cairo, 16 cents, applying as a basing rate to C. F. A. points; St. Louis, 19 cents; Kansas City, 24 cents; Memphis, 14 cents. A reduction is asked of 6 cents to Kansas City and 4 cents to the other gateways from points north of the proposed group line. The complainants are represented by W. E. McCormack and M. M. Armistead.

Advisory Valuation Committee.

The Interstate Commerce Commission announces the establishment of an "advisory committee" of five members to occupy an intermediate position between the board of engineers in charge of railroad valuation and the commission itself. Four of the members of the committee are, Charles S. Staples, railroad commissioner of Minnesota; City Engineer Bemis of Chicago; Prof. Henry C. Adams of the University of Michigan and formerly statistician to the commission, and W. C. Williams, an engineer of Virginia.

STATE COMMISSIONS.

The Indiana Railroad Commission has appointed Commissioners Payne and McClure as a committee to investigate the block signal situation and report what further block signal installations should be ordered, and Commissioners McClure and Clark have been appointed a committee to draft a new order regulating locomotive headlights.

COURT NEWS.

Commerce Court.

Judge Carland, of the Commerce Court, dismissed the complaint of the Louisville & Nashville against the Interstate Commerce Commission, in which the railroad asked the Commerce Court to set aside the order of the commission denying relief from the Fourth section on traffic between Louisville, Ky., and Nashville, Tenn. Basing his opinion on the *Procter & Gamble* case, 225 U. S., 282, Judge Carland found that the Commerce Court had no jurisdiction to review the action of the commission in dismissing complaints or denying petitions. The ruling in the *Procter & Gamble* decision was substantially as follows: The Commerce Court has jurisdiction only to entertain complaints as to affirmative orders of the commission; that is, the court has the right to take cognizance of complaints concerning the legality of orders rendered by the commission, and power to relieve parties in whole or in part from the duty of obedience to orders which are found to be illegal.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1913.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses					Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Transportation.	General.	Total.					
Central Vermont	411	$248,557	$98,907	$374,090	$33,811	$39,752	$8,197	$119,005	$6,535	$207,300	$166,790	$383	$20,715	$146,458	$27,322
Missouri Pacific	3,920	1,586,440	462,186	2,244,883	121,537	373,221	61,118	937,201	58,243	1,551,320	693,563	—3,764	98,981	590,818	319,863
New Orleans Great Northern	283	117,308	32,759	161,815	19,925	9,142	2,306	45,338	7,975	84,686	77,129	—81	2,371	74,677	9,938
St. Louis, Iron Mountain & Southern	3,365	1,762,804	522,218	2,479,941	426,942	428,039	54,054	822,630	22,716	1,754,381	725,560	4,099	125,393	596,068	69,880
Western Maryland	543	581,931	112,269	729,616	97,311	108,446	16,517	283,958	14,903	521,135	208,481	2,341	20,000	190,822	198,817
Wheeling & Lake Erie	459	675,412	51,868	765,696	192,341	186,286	7,346	242,069	43,516	671,558	94,138	2,073	32,209	64,002	—159,324
TWELVE MONTHS OF FISCAL YEAR, 1913.															
Central Vermont	411	$2,776,694	$1,099,240	$4,199,047	$461,502	$703,075	$98,725	$2,004,816	$97,420	$3,365,538	$833,509	$902	$176,968	$657,443	—$108,473
Missouri Pacific	3,920	20,528,498	5,155,914	28,018,909	3,814,428	4,853,669	743,648	11,809,090	810,551	22,031,386	5,987,523	—39,410	1,125,711	4,822,402	2,675,817
New Orleans Great Northern	283	1,300,519	363,230	1,801,343	265,124	165,602	29,788	531,906	80,904	1,073,324	728,019	—721	26,757	700,541	172,509
St. Louis, Iron Mountain & Southern	3,365	25,219,772	6,471,557	34,136,598	5,448,933	5,006,518	681,520	10,719,358	811,283	22,667,612	11,468,986	—53,594	1,188,638	10,226,754	1,514,913
Western Maryland	543	6,285,140	996,691	7,644,251	1,089,068	1,087,526	189,110	3,270,016	161,640	5,797,360	1,846,891	2,342	240,000	1,609,233	—501,976
Wheeling & Lake Erie	459	6,767,830	624,376	7,831,948	1,285,931	1,657,174	98,304	2,609,473	239,757	5,899,639	1,941,309	29,698	362,426	1,608,581	—509,938

Railway Officers.

Executive, Financial and Legal Officers.

Samuel L. Kamps has been appointed assistant to the vice-president of the Chicago Great Western, with office at Chicago, and will perform such duties as may be assigned to him.

F. C. Uhlman, auditor of the Virginian Railway, at Norfolk, Va., has been appointed assistant general auditor of the Western Maryland, with headquarters at Baltimore, Md., effective September 17.

Jess W. Lillienthall has been elected president, with headquarters at San Francisco, Cal., of the reorganized United Railways of San Francisco, succeeding Patrick Calhoun. Chas. N. Black, formerly general manager is now vice-president; G. B. Willcutt, formerly secretary and comptroller, is now secretary, and A. M. Dahler is treasurer.

Operating Officers.

J. H. Ellis has been appointed acting general manager of the Georgia Railroad, with headquarters at Augusta, Ga., in place of Thomas K. Scott.

W. H. Given has been appointed assistant general manager of the Waterloo, Cedar Falls & Northern, with office at Waterloo, Iowa; effective September 2.

Thomas H. Pindell has been appointed general superintendent of the Chicago, Peoria & St. Louis, with headquarters at Springfield, Ill., to succeed W. C. Hurst, resigned.

S. B. Moore, has been appointed assistant superintendent of the Globe division of the Arizona Eastern, with headquarters at Globe, Ariz., succeeding A. F. Moursund, transferred.

H. M. Taylor, formerly director of construction of the National Railways of Mexico, at Mexico City, Mex., is now general manager of the Brazil Railway, with headquarters at Sao Paulo, Brazil.

W. S. Martin, whose appointment as general manager of the Denver & Rio Grande, with headquarters at Denver, Colo., has already been noted in these columns, was born in December, 1863, at Keokuk, Iowa. He began railway work in 1878 with the Missouri, Iowa & Nebraska at Keokuk, and was clerk and telegraph operator until February, 1880. Subsequently he was assistant agent and agent at Alexandria, Mo., and during June, 1881, he worked for the Western Union Telegraph Company at Kansas City, Mo. From July, 1881, to January, 1885, he was with the Wabash, St. Louis & Pacific consecutively as operator in the freight office at Keokuk, operator in the despatcher's office, despatcher and chief despatcher at Centerville, Iowa, In February, 1885, he went to the Louisville, Evansville & St. Louis as chief despatcher, and was made master of transportation in April, 1887. He was appointed trainmaster of the Nashville & Decatur division of the Louisville & Nashville in July, 1889, and four months later was advanced to assistant superintendent of the Nashville division and the Nashville, Florence & Sheffield. Two years later he became superintendent of the Owensboro & Nashville, and in April, 1895, returned to the Louisville & Nashville as superintendent of the Louisville division, being transferred to the superintendency of the Henderson & St. Louis division at Evansville, Ind., in January, 1898. Mr. Martin severed his con-

W. S. Martin.

nection with the Louisville & Nashville in September, 1900, to go to the Denver & Rio Grande as general superintendent, which position he held until April, 1902. He was then from June 1 to December 31, 1902, superintendent of the Southern Railway at East St. Louis, Ill., and Princeton, Ind., and from January, 1903, to June, 1907, was general manager of the Mexican International. He resigned the latter position to return to the Denver & Rio Grande as assistant general manager, and on September 1, was promoted to general manager, as above noted.

J. E. Taussig has been appointed superintendent of transportation of the Texas & Pacific, with headquarters at Dallas, Tex., to succeed Page Harris, resigned to become vice-president of the National Creosote Company at Houston, Tex.

J. R. Hitchcock, acting general superintendent of the Atchison, Topeka & Santa Fe Coast Lines, at Los Angeles, Cal., has been appointed superintendent of the Los Angeles division, succeeding J. B. Galivin, assigned to other duties.

P. G. Walton, formerly assistant superintendent of the St. Louis, Brownsville & Mexico, has been appointed superintendent of the Fort Street Union Depot Company of Detroit, Mich., in charge of operation. The office of manager, heretofore held by G. E. Williams, is abolished.

Otis Weeks, division engineer of the Southern Pacific at Stockton, Cal, has been appointed assistant superintendent of the Salt Lake division, with headquarters at Ogden, Utah, in place of L. Beauman, transferred. George Geiger has been appointed assistant superintendent of the Salt Lake division, with headquarters at Sparks, Nev., to succeed F. W. Easton, transferred.

T. W. McGaw, trainmaster of the Seaboard Air Line, at Savannah, Ga., has been appointed superintendent of the Savannah Terminal division, recently created, comprising the following: All territory east of the West Yard limit board on the Alabama division, and between the North and South Yard limit boards on the South Carolina division, including Hutchinson Island, with headquarters at Savannah. The office of H. B. Grimshaw, superintendent of the Alabama division, has been transferred to Americus.

Traffic Officers.

H. P. Attwater has resigned as industrial agent of the Sunset-Central Lines of the Southern Pacific.

H. F. Kern has been appointed general agent of the Southern Pacific at Denver, Colo., succeeding W. K. McAllister, deceased.

C. E. Wharton has been appointed contracting freight agent of the Illinois Central at San Francisco, Cal., in place of J. H. Cosgrove, resigned.

W. A. Morrow, city passenger agent of the Missouri, Kansas & Texas at Waco, Tex., has been appointed district passenger agent at that place.

F. J. Burke, division freight agent of the Texas & Pacific at Dallas, Tex., has been appointed assistant general freight agent, with office at Dallas.

E. D. Moore has been appointed traveling baggage inspector of the Southern Railway, with headquarters at Washington, D. C., succeeding H. H. Little, promoted.

P. M. Havens has been appointed soliciting freight agent of the Cincinnati, Hamilton & Dayton at Indianapolis, Ind., succeeding D. B. Barclay, resigned to engage in other business.

L. M. Brown, chief clerk in the general passenger agent's office of the Denver & Rio Grande, has been appointed assistant general passenger agent, with headquarters at Denver, Colo.

James J. Lawrence has been appointed assistant general passenger agent of the Trinity & Brazos Valley, with headquarters at Houston, Tex., succeeding Sydnor J. Tucker, resigned to accept a position with William P. Bonbright & Company, New York. Effective October 1.

W. C. Staley, general agent of the Missouri Pacific and St. Louis, Iron Mountain & Southern at Chicago, has had his jurisdiction extended over the Denver & Rio Grande and Western Pacific, succeeding F. C. Gifford, who has been appointed agent of the four roads mentioned at Kansas City, Mo.

Engineering and Rolling Stock Officers.

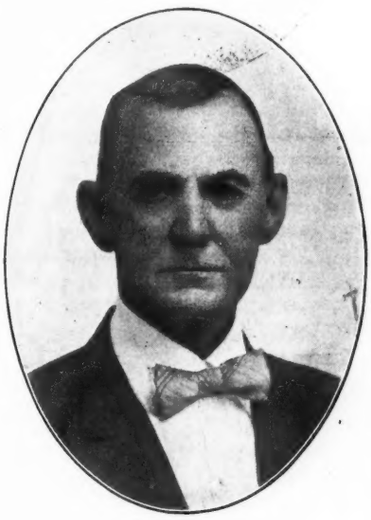
G. S. Weiler has been appointed acting general car foreman of the Gulf, Colorado & Santa Fe, with headquarters at Cleburne, Tex., succeeding R. W. Schulze, resigned.

George W. Abbott has been appointed division engineer of the Boston division of the Boston & Albany, with office at South Station, Boston, Mass., succeeding E. A. Haskell, deceased, effective September 2.

L. Beauman, assistant division superintendent of the Southern Pacific at Ogden, Utah, has been appointed division engineer of the Stockton division, with headquarters at Stockton, Cal., succeeding O. Weeks, transferred.

I. S. Downing, master car builder of the Lake Shore & Michigan Southern at Collinwood, O., has been appointed master car builder of the Cleveland, Cincinnati, Chicago & St. Louis and Peoria & Eastern, with headquarters at Indianapolis, Ind. District car foremen will report direct to Mr. Downing. Effective September 1.

J. H. Watters, assistant master mechanic of the Georgia Railroad, at Augusta, Ga., has been appointed master mechanic, with headquarters at Augusta, succeeding John S. Cook, deceased.



J. H. Watters.

He was born September 12, 1851, at Rome, Ga., and was educated in the high school of his native town. He began railway work in 1868 as a locomotive fireman on the Selma, Rome & Dalton, now a part of the Southern, and from 1871 to 1885 was locomotive engineman on the same road. He was subsequently master mechanic of the Anniston & Atlantic, and then until January, 1892, was master of transportation and master mechanic of the same road and of the Anniston & Cincinnati. Both of these roads are now a part of the Louisville & Nashville. In January, 1892, he was appointed master mechanic of the Louisville division of the Louisville & Nashville, and in October, 1901, went to the Georgia Railroad as assistant master mechanic, which position he held at the time of his recent appointment as master mechanic of the same road, as above noted.

G. W. Lillie, heretofore acting mechanical superintendent of the Rock Island Lines, has been appointed mechanical superintendent of the Second district, with headquarters at Topeka, Kan., succeeding C. M. Taylor, deceased, and George A. Hull, heretofore acting assistant mechanical engineer, has been appointed assistant mechanical engineer, with office at Silvis, Ill., succeeding Mr. Lillie.

John L. Hodgson, master car builder of the Grand Trunk at Port Huron, Ont., has been appointed superintendent of the car department of the Grand Trunk Pacific, with headquarters at Transcona, Man. He was born in 1858 at Simcoe, Ont., and entered the service of the Grand Trunk at Brantford, Ont. In 1884 he was transferred to Toronto, as car foreman, and since 1897 has been master car builder of the same road at Port Huron.

T. W. Coe has been appointed superintendent of shops of the Lake Shore & Michigan Southern, with office at Elkhart, Ind., succeeding W. J. Frauendiener, resigned. J. W. Senger, master car builder, at Englewood, Ill., has been appointed master car builder, with headquarters at Collingwood, Ohio, succeeding I. S. Downing, resigned, to go to the Cleveland, Cincinnati, Chicago & St. Louis. George Thomson, assistant master car builder at Englewood, succeeds Mr. Senger as master car builder at Englewood, and James Reed succeeds Mr. Thomson.

Purchasing Officers.

Albert Clinton Mann, who recently became purchasing agent of the Illinois Central, with headquarters at Chicago, as has been mentioned in these columns, was born September 1, 1881, at Effingham, Ill. He was graduated from the high school at Decatur, Ill., in June, 1898, and the following year took a stenographic course at Brown's Business College in the latter city. He began railway work January 10, 1900, as stenographer for a commercial agent of the Illinois Central at St. Louis, Mo., and later was bill of lading clerk in the same office. In February, 1902 he was advanced to secretary to the general agent at St. Louis, and four months later was transferred to Chicago as secretary and clerk to the coal traffic manager. In June, 1904, Mr. Mann entered the purchasing department as secretary to the purchasing agent, and was subsequently price clerk and chief clerk in that department. He was promoted to assistant purchasing agent in January, 1912, and in May of that year was made purchasing agent of the Central of Georgia at Savannah, Ga., which position he held until September 1, when he returned to Chicago as purchasing agent of the Illinois Central, as above noted.

A. C. Mann.

OBITUARY.

Frederick C. N. Robertson, auditor of the Pullman Co. at Chicago, died on September 9, at Montreal, Que. He was born July 26, 1848, at Toronto, Ont., and was educated at the Model Grammar School and Upper Canada College. Prior to 1882 he was engaged in banking and accounting in Canada, and since that time had been in the service of Pullman's Palace Car Co., and its successor the Pullman Co. From 1882, when he entered the service of Pullman's Palace Car Co., until 1885, he was assistant to auditor, and during the next two years was assistant auditor. In 1887, he was appointed first assistant auditor and on April 1, 1890, was promoted to auditor.

The accompanying photograph is that of the late John S. Cook, master mechanic of the Georgia Railroad at Augusta, Ga., who died on August 28, at Baltimore, Md., and a sketch of whose life was published last week, page 434. The photograph was received too late for use in that issue. Mr. Cook had been in railroad service 64 years, and he was with one company, the Georgia Railroad, for over 60 years. He had held the position of master mechanic on that road since 1878. He served in the Augusta shops throughout these 60 years, and the present shop buildings were built and equipped under his supervision.

J. S. Cook.

New Line for Argentina.—The Central Cordoba will build a new line from Cordoba to Mar Chiquita.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Philadelphia & Reading has ordered 12 consolidation locomotives from the company's shops.

The Toledo, St. Louis & Western has ordered 5 locomotives from the Baldwin Locomotive Works.

The San Antonio, Uvalde & Gulf has ordered 2 consolidation locomotives and 2 ten-wheel locomotives from the American Locomotive Company. The consolidation locomotives will have 20 in. x 24 in cylinders, 54 in. driving wheels, and in working order will weigh 140,000 lbs. The ten-wheel locomotives will have 19 in. x 26 in. cylinders, 56 in. driving wheels, and in working order will weigh 140,000 lbs.

CAR BUILDING.

The Northern Pacific is in the market for 40 refrigerator cars and 12 seventy-foot baggage cars.

The Bangor & Aroostook has ordered 58 flat cars and 13 box cars from the Middletown Car Works.

The Boston & Maine has ordered 500 gondola cars and 4,500 center sill constructions from the Pressed Steel Car Company, and 500 box cars from the Keith Car & Manufacturing Company.

The New York Central Lines have ordered over 300 passenger cars from the Pressed Steel Car Company, the American Car & Foundry Company, the Pullman Company and the Standard Steel Car Company.

IRON AND STEEL.

The Denver & Rio Grande has ordered 400 tons of bridge material from the American Bridge Company.

The Northern Pacific has ordered 3,000 tons of bridge material from the American Bridge Company.

General Conditions in Steel.—The aggregate buying of steel last week was light compared with the previous week. Consumers continue to hold back and orders are placed only for vital requirements. The prices continue to be shaded, although the official quotation has not been reduced. The Steel Corporation is still operating about 90 per cent. of its capacity and is not planning to reduce operations this month. The independent companies are operating at about the same rate of capacity, and their books show sufficient orders to keep them busy until the end of the year. The unfilled tonnage of the United States Steel Corporation August 31, was 5,223,468, a decrease of 175,888 tons as compared with July. This decrease is smaller than was expected.

Proposed Line for Paraguay.—A commission of engineers has arrived at Asuncion, Paraguay, to carry out the surveys for a line from Puerto Suarez to Santa Cruz. This line forms one of those which the Farquhar syndicate proposes to build.

Railroad Construction, Rome to Ostia.—For many years projects have been discussed for building a railroad from Rome to Ostia, the ancient seaport of Rome, which was once a flourishing port at the mouth of the Tiber river, but is now practically a deserted village, infested with malaria and, owing to the continual deposits of silt from the river, is some 2½ miles from the sea. There is, however, a fine beach for bathing, but, although only some 18 miles from Rome, it is practically inaccessible, as the place can be reached only by motor or bicycle. There is no doubt that the projected railroad would do a large business, especially in summer, and the renewal of communications would restore to Ostia some of its former prosperity. Construction of the line has now been approved by the government, and a concession is to be given to the city of Rome. This concession is to be handed over to a French company for execution, but no definite plans have been decided upon regarding the technical and financial details. The work may be started early next year.

Supply Trade News.

C. H. McCormick, for a number of years connected with the mechanical department of the Michigan Central, has been made district manager of the Standard Heat & Ventilation Company, Inc., New York, with office in Cincinnati, Ohio.

The Metal Treating & Equipment Company, Inc., New York, is just completing a plant at 834 Humboldt street, Brooklyn, N. Y., where job galvanizing work will be done by the improved Standard process of electro galvanizing. This plant will be ready for operation about the middle of September.

A. D. Wyckoff, efficiency expert of S. F. Bowser & Co., Fort Wayne, Ind., with office at Pittsburgh, Pa., has been made eastern railroad representative of that company, succeeding Frank T. Hyndman, who recently resigned to become superintendent of motive power and cars of the Wheeling & Lake Erie. Mr. Wyckoff has been with the Bowser company for a number of years, and has had a wide experience in designing equipment for the handling and storage of oils, as well as oil filtering and circulating systems for railroads and manufacturing institutions.

TRADE PUBLICATIONS.

DRAINS.—The Canton Culvert Company, Canton, Ohio, has published an illustrated folder on its Duro perforated, corrugated metal railway drains, pointing out the advantages of these drains and showing several installations.

SURVEYING INSTRUMENTS.—Kolesch & Company, New York, has issued a leaflet describing the Fulton pocket target, a handy and useful article for locating the line from which the plumb bob is suspended over a given point.

WRECKING HOOK.—The National Malleable Castings Company, Cleveland, Ohio, has published circular No. 63 on the Goodman wrecking hook. This hook fits any M. C. B. coupler, and can be easily attached to the wrecking cable.

MALLEABLE IRON CASTINGS.—The National Malleable Castings Company has published catalog No. 22 of its malleable iron castings for air brake equipment. This catalog is illustrated and gives the various sizes in which these castings come.

PROTECTION AGAINST CORROSION.—The Metal Treating & Equipment Company, Inc., New York, has published a booklet entitled, Protection of Iron and Steel Against Corrosion, in which is given an account of the Standard galvanizing process.

SECOND HAND MATERIAL.—Herman L. Winterer, Philadelphia, Pa., has published a partial list of his stock on hand available for immediate delivery. This list includes second hand machine tools, engines, boilers, dynamos and motors, pumps, general machinery, etc.

HIGH GRADE STEELS.—The Philadelphia Steel & Forge Company, New York, has published an attractive illustrated booklet, entitled, High Grade Steels, giving detailed information on its various products, including bars, strips, hot rolled and cold drawn shapes, wire and forgings.

ASBESTOSTEEL.—The Asbestos Protective Metal Company, Beaver Falls, Pa., has published bulletin No. 53, on its Asbestosteel for roofs and walls. This bulletin is devoted to the special use of asbestos protective metal in connection with concrete for construction of roofs and curtain walls. It is well illustrated and describes in a convincing manner the many advantages of this material.

FLEXIBLE UNIONS.—The Jefferson Union Company, Lexington, Mass., has published a folder on its flexible union. This is an entirely new product of this company and is designed for use where the steam pressure rises to 250 lbs. and over, and also where pipes are out of line, in which case this union can be used, it is said, in an equally efficient manner as if the pipes were absolutely straight.

SOUTH AFRICAN RAILWAY CONSTRUCTION BILL.—A bill has been introduced into the Union Parliament to provide for the construction of 795 miles of railways at an estimated cost of $13,290,000.

Railway Construction.

CAMPBELLFORD, LAKE ONTARIO & WESTERN.—See Canadian Pacific.

CANADIAN PACIFIC.—In connection with the building of the Campbellford, Lake Ontario & Western from a junction with the present Montreal-Toronto line at Agincourt, Ont., to Glen Tay, second track is being built from the point of junction into Toronto. The work involves putting up two new single track bridges, one over the Don river and the other over the West Don river; also the reduction of the present gradient between Wexford and Donlands, Ont. (April 18, p. 925).

Track laying was started on August 18, west of Islington, Ont., on the second track being built from that point to Guelph Junction. The grading is completed to a point west of Cooksville. Between Cooksville and Streetsville there are some large cuts and fills, on which considerable progress has been made. From Streetsville to Guelph Junction the work is also well advanced. The work will be finished this fall. (September 5, p. 436.)

The Railway Commission of Canada has approved the location plans for the extension of the branch line now terminating at Gimil, Man., north, to Riverton, 26.05 miles. They have also approved the location plans of the Snowflake westerly branch for 9.10 miles from sec. 19, tp. 1, range 9, westerly to sec. 14, tp. 1, range 11.

ELKIN & ALLEGHENY.—An officer writes that the work under way for some time on the extension northwest to Sparta, N. C., about 40 miles from Elkin, is expected to be finished on a section of four miles this fall. The road is now in operation from Elkin via State Road to Thurmond, 12 miles. (November 22, p. 1013.)

GRAND TRUNK.—John Marsch, who has the general contract to build the Southern New England from Palmer, Mass., to the Rhode Island state line in Massachusetts, is said to have ordered the sub-contractors to resume work. (August 22, p. 353.)

MEMPHIS & PENSACOLA.—This company, which was organized some time ago to build from Memphis, Tenn., southeast to Pensacola, Fla., about 370 miles, has been reorganized, it is said, and has increased its capital from $1,000,000 to $15,000,000. The work was suspended about three months ago, and was resumed recently at Pensacola. John Claney, Chicago, has been elected president. Byron H. Joy and J. C. McNish, are directors, and will have their headquarters at Pensacola, during the construction of the line. (July 7, 1912, p. 1263.)

OAKLAND, ANTIOCH & EASTERN (Electric).—This company began operating trains on September 3, between Sacramento, Cal., and Oakland, 91 miles. The Shepard Pass tunnel, built for this road, located about five miles from Oakland, is nearly two-thirds of a mile long. The distribution system from the railway substations is 1,200 volt d. c., with overhead catenary construction. The power is supplied by one of the large hydro-electric companies whose lines intersect the railway.

SAN ANTONIO, FREDERICKSBURG & NORTHERN.—This company has finished work, it is said, on the line from a point on the Kerrville branch of the San Antonio & Aransas Pass, about four miles northwest of Waring, Kendall county, Tex., north to Fredericksburg in Gillespie county, about 25 miles. An officer is quoted as saying that plans are being made to build an extension from Fredericksburg, north via Brady, to Coleman, about 100 miles. R. A. Love, president; F. Crane, vice-president, and A. L. Cunningham, chief engineer. (February 14, p. 314.)

SAN BENITO & RIO GRANDE VALLEY.—This company, operating about 65 miles of line, has plans made for building an additional 155 miles. Work was resumed recently, it is said, on an extension to Roma, in the Rio Grande valley, which is about 60 miles west of Mission. The line will eventually be extended to the coal fields of Zapata county. It is said that the property has been taken over by a St. Louis syndicate. (May 2, p. 1013.)

SOUTHERN NEW ENGLAND.—See Grand Trunk.

RAILWAY STRUCTURES.

BUFFALO, N. Y.—We are told that the Terminal Commission of Buffalo has approved the contract and agreement between

the city and the Delaware, Lackawanna & Western, under which the railroad company is to build a passenger and freight terminal on the site of the present station in Buffalo. Under the terms of the agreement work must be begun within three months.

Cleveland, Ohio.—D. H. Burnham & Co., architects, Chicago, have submitted to the mayor tentative plans for a new union station and approaches to be built by the New York Central and Pennsylvania lines, to cost about $17,000,000. Alternative plans are included for a bridge and a subway approach to the tracks, which will be elevated 22 ft. above the present level.

Dallas, Tex.—It is announced that the contract for the extensive terminals to be built by the Dallas Union Terminal Company at a cost of approximately $5,000,000, will soon be awarded. The site for the proposed improvements has been acquired. All of the railways entering Dallas are stockholders in the terminal company.

Gibson, Ind.—The New York Central Lines are planning an extensive addition to the yards at this point, including a large transfer station for L. C. L. freight.

Harrisburg, Pa.—An officer of the Pennsylvania Railroad writes that in connection with the improvements contemplated in Harrisburg, and the vacation of several streets to permit the Pennsylvania Railroad to build a freight station and the Cumberland Valley to abolish the grade crossings at Front, Second and Third streets, an ordinance was recently passed vacating certain streets and changing grades of others so as to permit them to pass under the Cumberland Valley tracks. It is understood that when this work is carried out under the ordinance the Cumberland Valley will lay a double track from the Susquehanna river to the passenger station.

Kansas City, Mo.—The Kansas City Terminal Company has let the general contract for the station power house for the Union station, now under construction, to the Fogel Construction Company of Kansas City.

Philadelphia, Pa.—Bids are wanted, September 19, by Morris L. Cooke, director, department of public works, Philadelphia, for putting up bridges as follows: On Fifty-fifth street under the Philadelphia & Baltimore Central (Westchester & Philadelphia), a double track 3-span steel railroad bridge to have a total length of 88 ft., with concrete abutments; on Tenth street under the Tabor branch of the Philadelphia & Reading, a three-track single span about 90 ft. long, and under the Newtown connecting railroad a double-track single span, both to have steel superstructures and concrete abutments, and at Luzerne street over the Oxford road branch of connecting railway, a 35-ft. concrete arch highway bridge. The cost of the work is to be paid for jointly by the city of Philadelphia and the railroads whose tracks they cross. In addition a bridge is to be built on the line of Eighty-fourth street over Darby creek, the cost to be paid for jointly by Philadelphia and Delaware counties.

Richmond, Va.—An officer of the Richmond, Fredericksburg & Potomac writes regarding the construction of a passenger station in Richmond to be built jointly by the R. F. & P., and the Atlantic Coast Line, that while the officers of both these roads favor the construction of such a station the matter has not yet been passed upon and approved by the boards of directors. Plans are being made for a five-story structure, 244 ft. x 108 ft., to be built on Broad street, with a passenger concourse 65 ft. deep and 290 ft. wide. A special building 50 ft. x 200 ft. is also to be put up for baggage, mail and express rooms.

Schuylkill Haven, Pa.—An officer of the Philadelphia & Reading writes that a contract has been given to P. Campion, Mahanoy City, Pa., for putting up the steel and brick freight house, also the office building at Schuylkill Haven. (August 29, p. 396.)

Stratford, Ont.—An officer of the Grand Trunk writes that the company's forces are now at work building the granite and stone passenger station at Stratford. The building is to be two stories high, 72 ft. x 300 ft., and will cost about $60,000. (August 15, page 314).

Superior, Wis.—Plans are being formulated by the Great Northern for the construction of a steel and concrete ore dock at Allouez Bay, to replace the present timber structure.

Railway Financial News

Atchison, Topeka & Santa Fe.—*The Commercial & Financial Chronicle* says that stockholders are to vote on October 23 on the question of leasing the Verde Valley Railway and the Dodge City & Cimarron Valley.

Erie.—White, Weld & Co. and Brown Brothers & Co., both of New York, are offering $1,120,000 series A 5 per cent. equipment trust certificates, due semi-annually March 1, 1914, to September 1, 1923, and $1,000,000 series V 5 per cent. equipment trust certificates due annually June 15, 1914, to June 15, 1923, at prices to yield 5.50 per cent. interest on the investment. The series A certificates are issued by the Commercial Trust Company of Philadelphia and guaranteed principal and interest by the Erie and secured by equipment on which the Erie paid 18 per cent. of the total price in cash. The series V are a direct obligation of the Erie and are secured by equipment on which the Erie paid 15 per cent. of the total purchase price in cash.

Florida East Coast.—The directors have declared 2½ per cent. on the $20,000,000 general mortgage income bonds for the year ended June 30, 1913. In 1912 the same rate was paid, and in 1911 4 per cent.

Galveston-Houston Electric.—The directors have declared a semi-annual dividend on the common stock, payable September 15, making a total of 5½ per cent. declared in 1913, as compared with a total of 3½ per cent. paid in 1912.

New York, New Haven & Hartford.—See editorial comments elsewhere in this issue on the withdrawal of the firm of J. P. Morgan & Company as the sole fiscal agent for the road.

St. Louis & San Francisco.—The semi-annual interest, due September 1, on the $28,582,018 New Orleans, Texas & Mexico division bonds was not paid, and the receivers have made no provision for interest on the $2,600,000 2-year notes.

Southern Pacific.—Of the $88,357,600 Southern Pacific certificates of interest offered to Union Pacific stockholders, $81,005,400 were subscribed for, leaving but about 8 per cent. to be distributed among the 600 members of the syndicate of which Kuhn, Loeb & Company are the head.

Railway Activity in Norway.—The Norwegian Storthing has definitely decided to build a 23-mile state railroad from Noragutu to Skien, on the west coast, the cost of which, it is estimated, will be about $1,850,000. Five iron bridges with brick abutments will be built, but only Norwegian manufacturers will be allowed to furnish this material. The necessary cars and locomotives are estimated to cost $103,500. Construction will be started early next spring.

Argentine Railway Merger.—The public works committee has favorably reported the bill permitting fusion of the Buenos Aires Great Southern and Buenos Aires Western (Farquhar syndicate) under the name of Ferrocarril del Sud y del Oeste Argentino. Little alteration has been made in the bill as approved by the senate. The capital is to be the same as that already recognized by government for the two companies, as well as any new capital that may be invested, the company to build 930 miles of new line to join up various parts of the two systems, and the period is fixed in which this work is to be carried out. A guaranty deposit of $127,000 is to be made for the faithful carrying out of the new works.

Cableway Up Mont Blanc.—A cableway connecting the Hameau des Pelerins at Chamonix with the Col du Midi is being constructed. It will serve the Pierre Pointue, situated on one of the most frequented routes for reaching Mont Blanc from Chamonix, and will thus facilitate access to the Grands Mulets. The driving plant will be placed in the upper stations of each section, and will consist of an electric motor of 100 h. p. working the driving pulley of the hauling cable by means of gearing. The works are expected to be completed in 1916. The first section from the Pelerins to La Para is now almost ready, but is not expected to be put in service before 1915, when the glacier des Bossons will be reached. The total cost is estimated at $600,000.